# SYLLABUS

OF

# A COURSE

OF

# *CHEMICAL LECTURES,*

READ AT

GUY'S HOSPITAL.

BY

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# PREFACE.

In every Science taught by lectures, a Syllabus of the Courſe has been found uſeful to the ſtudent. He is thereby furniſhed with a conciſe ſtatement of the ſeveral diviſions of the ſubject, and of its general arrangement. He is ſupplied with definitions of ſcientific terms, and is enabled to connect, and retain with facility, the information he receives.

The objects of Chemiſtry being various, its views extenſive, its principles of union as a ſcience, ſubtle, and its inveſtigations minute, the aid of ſuch a ſynopſis was as neceſſary to it as to any other branch of Natural Philoſophy. Modern improvements as they have enlarged the ſcope of this ſcience, have added to the uſes of a proſpectus to explain it. The diſcoveries which have been recently made are ſo various and important, the Nomenclature has undergone, within theſe few years, ſuch a complete and eſſential change, that the Chemiſtry of the preſent day may be not improperly conſidered—as a new ſcience expreſſed in a new language.

It is on theſe grounds, that the author has thought it his duty to draw up the following Syllabus of the lectures which he reads at Guy's Hoſpital.

As his courſe is neceſſarily deſigned for Medical Students, he has beſtowed particular attention on thoſe parts which relate to their profeſſion. He has not, however, by any means confined his views to this object alone, knowing that there is ſcarcely a ſcience or an art, ſcarcely a manufacture or an occupation, in which an acquaintance with chemical reſearch is not productive of advantage; that although the ſcholar, the artiſt, and the gentleman, may approach it with different views, each will obtain information more than ſufficient to reward him for the purſuit.

The author has, on this account, endeavoured to arrange the elementary principles of the ſcience, ſo as to render them applicable not only to medical purpoſes, but to every other to which Chemiſtry is adapted; and in doing thus much, he is not without hope, that, independent of preſent advantage, he ſhall have made himſelf uſeful to his pupils when they have ceaſed to attend him; that by future peruſals of this Syllabus, they may recall ſome valuable information which length of time or diverſity of employment had eraſed from their memories; that it may ſerve as a general outline of the ſcience, which they may fill up at their leiſure,—as a ſyſtematic arrangement, to which they may refer whatever they can learn of others or diſcover of themſelves.

Although the ſyſtems of the older chemiſts are now exploded, and many of their principles ſhewn to be fallacious, their works are ſtill acknowledged to contain valuable ſources of information. But as the ancient Nomenclature differs ſo eſſentially from the modern, the young ſtudent often finds the meaning of theſe authors involved in conſiderable obſcurity. To obviate this difficulty as much as poſſible for the learner, tables are ſubjoined after the manner of the *Tabl. de la Nomenclat. Chim. propoſ. par M. M. Morveau Lavoiſier*, &c. in which the old and new names of chemical ſubſtances are ſo claſſed, as to be brought under the eye, and compared at one view; and as ſome pains have been taken to render theſe tables at once copious and correct, it is hoped that they will, on moſt occaſions, be found to anſwer their intended purpoſe.

*The properties of Light, ſo far as it is fit to conſider them in a chemical point of view, are comprehended under the head of the opinions regarding Caloric.*

# Introduction

Dr Black defines Chemistry to be the Science or Study of those effects qualities of Matter which are discovered by mixing bodies variously together, or applying them to one Another with a view to Mixture, and by exposing them to different degrees of heat, alone, or in mixture with one Another, in order to enlarge our Knowledge of nature, and to promote the useful Arts.

Or, in ~~in~~ fewer Words, that the Chemist studies the effects produced by heat and by Mixture, in all Bodies or Mixture of Bodies, natural or Artificial, and studies them with a View to the improvement of Arts, and the Knowledge of Nature; May it be thus defined?

Chemistry is the Study of the effects of heat and Mixture, with the View of Discovering their general and subordinate laws, and of improving the useful Arts.

# SYLLABUS OF CHEMISTRY.

## INTRODUCTION.

OF the properties of *Matter*, the ſubject of experimental philoſophy in general.

Theſe either common to all bodies, as *Extenſion*, *Impenetrability*, *Diviſibility*, *Weight*; or proper to particular bodies, as *Colour*, *Figure*, *Texture*, *Solubility*, &c.

From the conſideration of the peculiar properties of *Matter* ariſes its diſtribution into different *Kinds*; and from the action of *theſe* upon each other, the various *Combinations* and *Decompoſitions* which conſtitute the province of CHEMISTRY.

CHEMISTRY therefore defined, *The Science of the Compoſition and Decompoſition of the heterogeneous particles of Matter:* or, "that which teaches the intimate and reciprocal action of Bodies upon each other.

Of the diſtinction between this, and other branches of natural knowledge, more eſpecially *Natural Hiſtory* and *Natural Philoſophy.*

What is generally underſtood by the *Vis Inertiæ* of matter.

Of the *Motion* of bodies, as communicated to them by *external Impulſe,* or excited in them by their diſpoſition to *attract,* or *repel* each other.

Of the different ſpecies of *Attraction* which originate from this diſpoſition, viz. of *Magnetiſm*—of *Electricity*—*Capillary Attraction*—*Attraction of Gravitation*—*Attraction of* aggregation or *Coheſion* and *Chemical Attraction.*

## OF CHEMICAL ATTRACTION.

This found to operate excluſively between ſuch particles of matter as are *diſſimilar,* or *heterogeneous.*

It takes place amongſt the *more minute Particles* of matter, and at *inſenſible Diſtances.*

It requires that theſe ſhould poſſeſs a certain degree of *Fluidity.*

It

*The greatest degree of Cold that can be produced is from a mixture of muriate of Lime with [illegible] powdered Snow or Ice.

# Introduction

## Of the Attraction of Aggregation

The homogeneous particles of Bodies united by this Attraction with different degrees of force: hence hardness, Softness, fluidity, State of Vapour, and of Air or Gas.—

Also affected by it in different modes: hence Brittleness, Ductility, Malleability, Texture, and External Figure.—

## Of Chemical Attraction

emical attraction can only take place by immediate ntact, and the particles of matter must also ossess a certain degree of fluidity. For example take itrate of Copper, and Oxyd of Tin, mixed together and aid upon Tinfoil without moisture, they will remain r any length of time unchanged, but by the addition a little water they immediately go into a state combustion, and this shows a change of Temperature hich a priori always takes place more or less, s is further seen, if you take a certain quantity muriate of Ammoniac, nitrate of Potash and water. mix these he seperate temperature being between 50 and 60) you will find them reduced below the freezing point, And by mixing Spirits of Wine with water you will have an increase of Temperature with a diminution of bulk ——

# Of Chemical Attraction

The consistence is also altered, as is remarkable seen in the union of Carbonate of Potash with a solution of Sulphate of Magnesia ——

The colour is also changed as is seen by taking a quantity of water and adding a few Drops of the Sulphate of Iron and also a few Drops of the Sulphuric Acid to render the solution colourleſs, then by the addition of a single Drop of the Pruſsiate of Lime you will have a beautyful Blue appearence ——

Single Elective attraction is when you employ simple substances, as for Example take Nitrate of Quicksilver and add to it a little copper you will have Nitrate of Copper, because the Nitric Acid has a greater affinity to the Copper than the Quicksilver, therefore leaves it and combines with the Copper ——

Double Elective attraction is when you employ compounds, so as to produce substances of a different nature from those you employ as for Example take Muriate of Ammoniac, and Carbonate of Lime, put them into a florence flask and expose them to a neceſsary degree of heat, and you will have Muriate of Lime and Carbonate of Ammoniac ——

When water is saturated with one substance it is capable of taking up an additional quantity of another, so that you may have two substances compleatly saturated, so as to produce different Crystals when evapourated ——

It produces in their properties very remarkable changes, of *Temperature*, *Specific Gravity*, *Texture*, *Colour*, *Taſte*, *Smell*, &c. ſo that the properties of the compound can ſeldom be deduced from thoſe of its component parts.

This attraction exerts itſelf between different bodies with different degrees of *Force*; hence the important doctrine of *Chemical Affinity*.

Of the conſtruction of tables of *Simple* and *Compound Affinity*, called alſo tables of *Single* and *Double Elective Attraction*.

Of *Saturation*, or the limitation to the proportions in which certain bodies *chemically* unite.

Of the means by which the power of *Chemical Attraction* may be increaſed or diminiſhed

The influence of *Heat* on it more eſpecially remarkable.

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## OF CALORIC.

How the terms *Caloric*, *Matter of Heat* or *Fire*, *Temperature*, &c. are philoſophically to be underſtood.

Of the various opinions which have been entertained with regard to the nature of *Caloric*.

It exiſts either in a *looſe* ſtate, producing in different bodies *Warmth*, *Expanſion*, *Fluidity*, *Volatility*, &c. in proportion to its quantity; or in a ſtate of *Combination* in which its properties ceaſe to be evident; in the one caſe called *ſenſible*, in the other *latent*.

*Caloric* in a *ſenſible* or *looſe* ſtate has a tendency to diffuſe itſelf among contiguous ſubſtances, ſo as to maintain an uniformity of temperature.

It paſſes from one body to another with more or leſs celerity according to its intenſity. *Denſe* bodies alſo tranſmit it more readily, than *rare*; hence the diſtinction between more or leſs perfect *Conductors* of *Caloric*.

In *fluid* bodies it keeps up a perpetual circulation of their particles.

Equal quantities of *Caloric* produce unequal temperatures in equal quantities of diſſimilar ſubſtances. Bodies therefore ſaid to have different *Capacities* for *Caloric*, or to differ in their *ſpecific* or *comparative Heats*.

# Of Caloric.

dies alter in their dilatation and contraction
ccording to their Temperature, and on this principle
t is that the Cooper heats the hoop before he applies
to the Tub, for in cooling its application becomes
ore close than the greatest mechanical pressure
uld possibly produce, Now whether you take them
their solid form, as Iron, or in the liquid form
s Quicksilver or Spt. Vini: Rect: or in the Aeriform;
s the common Atmosphere, their dilatation and
ntraction are according to their degree of heat or
ldness —

n the application of the Thermometer to Liquids it
the medium of temperature that is given you,
d not the Temperature abstractedly —

t appears to have for different Bodies different degrees of
lective attraction —

he Specific Caloric of Bodies must be measured by the
uantity of Ice or Snow which they are found capable
melting. — Justly considered as a fluid of universal
gency. —

you take equal quantities of quicksilver and
ter, the temperature of the quicksilver being 60
ees and the Water 140. mix these and instead of
liquor being of 100 degrees the arethmetic mean,
— will have it about 105. but the effect will be
ite the opposite if you take the quicksilver at
egrees and the water at 60 degrees the arethmeti
n would be 89. but instead of which it will
y be 82 degrees — If you put a pint of boiling water
a pint of Ice instead of being at the temperature of 90½ degrees
will be as low as 60 and if the water was not sufficient to
olve the Ice the temperature would hardly be below the freezing point

## Of Caloric

The capacity of Bodies for Caloric varies according to their state of aggregation —

The Caloric which a Bodies gives out in passing from a state of Aggregation to another, it will again absorbs in resuming its original state —

A variation in the *Temperature* of bodies univerſally accompanied by a variation in their *Bulk.*

In ſome the dilatation and contraction appear to correſpond with the quantity of *Caloric* by which they are occaſioned. Hence the conſtruction of the *Thermometer.*

Of the precautions to be obſerved in the application of this uſeful inſtrument.

Of the *Liquefaction*, *Melting*, or *Fuſion* of bodies.

Of their *Volatilization*, or converſion into vapour by *Caloric.*

In this ſtate (of Vapour) they poſſeſs a high degree of *Elaſticity*. Upon the expanſive power of volatized water depends the effects of the *Steam Engine.*

To the head of *Evaporation* may alſo be referred the proceſſes of *Diſtillation*, and *Sublimation.*

By accumulated *Caloric* bodies may be either rendered *luminous*, without ſuffering any other eſſential change; or they may be entirely altered in their properties, producing at the ſame time *Light* and *Heat.*—In the one caſe they are ſaid to be *ignited*, in the other *inflamed.* Hence the diſtinction between *combuſtible* and *incombuſtible* ſubſtances.

The

The *Inflammation*, or *Combuſtion* of bodies takes place only when they are expoſed to *Air*. The ſubjects of *Caloric* and *Air* therefore naturally connected.

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## OF ATMOSPHERICAL OR COMMON AIR.

Of the *Weight*, *Elaſticity*, and other general properties of this fluid.

Subject to various changes from viciſſitude of temperature and other accidental cauſes.

Of the *chemical* properties of the inferior ſtratum of the *Atmoſphere*.

Shewn both by *Analyſis* and *Syntheſis* to be compoſed of two parts.

One by which *Reſpiration* and *Combuſtion* can alone be ſupported, *Oxygen Gas*.

The other in which both *Life* and *Flame* are immediately extinguiſhed, *Azotic*, or *Nitrogen Gas*.

# Of Atmospherical Air

r a serious of time Atmospherical Air was considered
homogeneous, or simple in its nature, and one of
Elements, but it is now found that this fluid
capable of being resolved into constituent parts
Elements —

quantity, of water which it holds in solution depends,
t only upon its temperature, but also upon its density —

# Of Oxygen Gas

Dr. Priestley and Mr. Sheele were the first who discovered its curious and important properties; the cheapest way of procuring it is from the oxyd of manganese, but the substance which furnishes it in the greatest quantity and purity is the oxy: muriate of Potash ——

In diminishing the bulk of Atmospherical air it is the Oxygen which is absorbed, therefore the extent of the diminution depends upon the quantity of Oxygen it contain Therefore if you expose this air to the Nitrous gas you may test the purity of it, by the diminution which takes place But the most accurate way of testing this is by adding it, to a solution of the Sulphate of Iron in the Nitrous Gas —

The colour and consistance is remarkably changed in some bodies which are exposed to it, as is seen in exposing some oils and balsams they becoming in time Resins and Gums. —

It serves the purpose of combustion, as is beautifully seen upon exposing lighted charcoal or a piece of steel to this air, it being inclosed in a bottle — also phosphorus

Charcoal upon being burnt in Oxygen Gas produces Carbonic acid gas; this is also produced in Respiration by the oxygen which is absorbed, going into union with the Carbon contained in the **Blood**; thus forming Carbonic acid Gas ——

The combustion of bodies are various as circumstances you employ and there is also a remarkable difference in the result according to the manner in which the combustion is conducted —

## Of Oxygen Gas. or

Called formerly Dephlogisticated, Pure, Superial or Vital Air. —

Obtained in a ſeparate ſtate from *metallic Oxyds* and compounds of the *Nitric* and other acids by the application of heat.

Its purity aſcertained by exposure to a solution of Green Sulphate or Muriate of Iron Saturated with Nitrous Gas or by mixture with *Nitrous Gas.* with *Eudiometer.*

Somewhat heavier than *Common Air.*

Is abſorbed by many bodies upon ſimple expoſure, as in *Fermentation, Bleaching*, &c.

Serves the purpoſes of *Reſpiration* and *Combuſtion* in an eminent degree.

In *Reſpiration* is diminiſhed in bulk, and produces *Carbonic Acid Gas*; hence the supposed function of the *Lungs* and origin of *Animal Heat.*

By combuſtion with *Hydrogen Gas* (ſo named from this property) it forms *Water*, together with a portion of Nitric acid, if the combustion be rapid. —

In the combuſtion of many other bodies, as *Sulphur, Phoſphorus, Charcoal,* &c. whilſt *Heat* and *Light* are given out, it communicates to them the properties of *Acids.* The gas itſelf diſappears, but produces in the acid *Reſidua* an increaſe of weight proportional to the quantity

conſumed;

conſumed; hence the modern theories of *Combuſtion* and *Acidification*, as depending on the decompoſition of *Oxygen Gas* and the conſequent union of its *Baſe* with the ſubſtances employed to effect it; and hence the terms *Oxygen* and *Oxygenation.*

*Metals* by combuſtion approach to an acid ſtate, to which ſome may be brought by a further acceſſion of *Oxygen*; hence the terms *Oxyd* and *Oxydation.*

## Of Azotic Gas.

Called formerly Phlogisticated Air, and Mofete: —

Remains after the abſtraction of *Oxygen Gas* from *Atmoſpherical Air* on its expoſure to *Sulphuret of Potaſh*, a mixture of *Iron Filings* and *Sulphur*, &c.

Obtained in its pureſt ſtate from a mixture of *Oxy-muriatic acid* and *Ammoniacal* gaſſes.

Lighter than *Atmoſpherical Air.* When pure no smell or

Noxious to *Life* and *Flame*, but not to *Vegetation.*

* Forms a conſtituent part of *Animal Matter.*

* If you add nitric acid to a piece of muscle, azotic gas will be evolved in considerable quantities.

More

# Of Oxygen Gas

# Of Azotic Gas, Or Nitrogen Gas.

s gas has never been found in an uncombined state, it is efore reasonable to think that a chemical union exists ween it and oxygen, their specific gravity being so widely erent, it is also impoſsible of being absorbed by Water, ds or Alkalies therefore readily decomposed.—

is differs from most other gases in being incapable absorption by Water, or by the Liquid forms either Acids or Alkalies—

olved in the decomposition of Animal and Vegetable bstances, of which it is therefore generally thought orm a constituent part.—

## Of Azotic Gas

By taking certain quantities of oxygen and azotic gas and submitting these to the Electric Spark Nitric Acid is formed ——

Oxygen is supplied by Vegetables under the influence of Light ——

## Of Water

At a middle temperature a Cubic foot of Water weighs nearly 1000 Ounces avoirdupois.—

It enters into most Bodies as a constituent part, and its freezing is facilitated both by access of Air and agitation—

Ice at the freezing point absorbs in melting, a quantity of Caloric sufficient to raise an equal portion of Water at the same temperature, to above 107° of Fahren<sup></sup>t —

Under the ordinary pressure of the Atmosphere, its volume in the state of vapour is to that of liquid Water as 833 to 1; and the quantity of Caloric which it contains in this state also proportionally greater hence the heat given out in its Distillation; and the warmth produced in the Atmosphere by the condensation of Aqueous Vapour —

More particularly characteriſed by the production of *Nitrous Acid* on its union with *Oxygen*, and of *Ammoniac* with *Hydrogen*. From the former of theſe properties obtains the name *Nitrogen.*

Of the means employed by nature to maintain a due proportion between this and *Oxygen Gas* in the compoſition of the *Atmoſphere.* Besides the Oxygen Vegetables supply, it is reasonable to suppose that there are resources in nature that we are unacquainted with.

## OF WATER.

The *phyſical* properties of *Water* differ in the *ſolid*, *liquid*, and *gaſſeous* or *vaporous* ſtates of aggregation, which depend upon the influence of *Caloric.*

In its paſſage from the *liquid* to the *ſolid* ſtate of aggregation, there takes place an increaſe of *Temperature*, an extrication of *Air*, or other extraneous matter previouſly contained, a peculiar arrangement of *Particles*, and a conſequent augmentation of *Bulk.*

The *Expanſion* of *Water* in the act of *Congela-*

The proportions of Hydrogen and ~~[illegible]~~ Oxygen in the composition of Water, said to be 15 of the former to 85 of the latter_ *tion* exerts itſelf with irreſiſtible force; hence the beneficial effects of froſt on ſome occaſions and its inconveniences on others.

*Water* in the liquid ſtate to a certain degree *compreſſible.*

Poſſeſſes in this ſtate a *ſolvent* power over moſt other bodies, ſeldom therefore free from impregnation.

It enters into many bodies as a *conſtituent* part.

The temperature at which it paſſes to the ſtate of vapour proportional, as in all other *Liquids*, to the degree of preſſure made upon its ſurface, as ſeen in the application of *Papin's Digeſter*.

The *Vapour* of *Water* highly *elaſtic*; hence, as already mentioned, the conſtruction of *Steam Engines.*

By the *Vapour* of *Water* the combuſtion of many bodies is accelerated. When applied to heated *Iron*, *Zinc*, and other metals, it converts them into *Oxyds*, yielding at the ſame time *Hydrogen Gas*, which produces *Water* in combuſtion with *Oxygen Gas*, as before ſtated.

*Water* therefore no longer conſidered as an *Element*, but compounded of the *Baſes* of theſe two fluids. this may account for Rain by supposing these two fluids coming into contact in the atmosphere, under combustion.

Of

# Of Hydrogen Gas

Inflammable air may be obtained from the Application of water or Vapour to Iron filings, it changes the Iron into a state of Oxydation, and disengages the the Hydrogen Gas —

The purest Hydrogen Gas is obtained from Iron and Zinc with diluted Sulphuric Acid, but it is not given out by Acids in their concentrated state, Dr B— is of opinion that this Gas has never been prepared purer than 12 to 1 —

Unless this Gas has an opportunity of mixing with Atmospherical or Pure Air it will not go into a state of combustion —

When impregnated with Carbonic Acid gas, it forms Hydro, Carbon: —

When passed through burning sulphur it forms Hepatic air or Hydro. Sulphur which is a very noxious smell —

When in union with Phosphorous forms Hydro Phosphorus —

It may also be united with different Bituminous substances hence the distinction into heavy and light Inflammable air's —

In its nascent state it is found to be capable of combining both with Oxygen and Azote; with the one producing Water, as in the case of combustion; and with the other, Ammoniac. —

# *Of Hydrogen Gas, or Inflammable Air.*

Found in a diſengaged ſtate in *Coal Mines*, on the ſurface of *Stagnant Waters*, and riſing through the waters of certain *Springs*.

Obtained alſo artificially from the diſtillation of *animal*, *vegetable*, and *bituminous* matter; from the application of heat to *Eſſential Oils*, *Alcohol*, *Æthers*, &c. and from pure *Ammoniac* by means the *Electric Spark*.

Pureſt from the decompoſition of *Water* by *Metals* as above ſtated, or during their ſolution in *diluted Acids*.

When pure many times lighter than *Atmoſpherical Air*; hence the conſtruction of *Aeroſtatic Machines*.

Smell adventitious.

On inſpiration proves noxious to *Animal Life*, apparently by the excluſion of the *reſpirable* part of the *Atmoſphere*; hence its late application in the treatment of certain diſeaſes, ariſing as it has been thought, from exceſs of *Oxygen* in the ſyſtem.

Burns only when in contact with *Oxygen Gas.* The *Slowneſs* or *Rapidity* of the combuſtion depends on the proportions, and intimacy of the previous Mixture.

On all occaſions *Water* is the conſequence.

The extrication of *Oxygen Gas* from vegetables growing under the influence of light depends, according to the general opinion, on the decompoſition of *Water,* the *Hydrogen* of which is abſorbed.

*Hydrogen* and *Nitrogen Gaſſes* by their union compoſe *Ammoniac.*

## OF ACIDS.

Diſtinguiſhed by being *ſour* to the taſte, changing vegetable *blue* colours to *red,* and by their extenſive power of combining with other ſubſtances.

All unite readily with *Water.*

In

## Of Hydrogen Gas

## Of Salts.

e characterized by being sapid & of a saline taste, and
dily soluble in Water; On exposure to Air generally
er receive or impart moisture; hence said to be
quescent or efflorescent. —

y are divided into simple or compounded, the more simple
Acids and Alkalis, — the compounded, such as result from
union of these with each other, neutral Salts, — or of the
ds with the Earths and Metallic oxyds, Earthy and Metallic
ts —

## Of Acids

line substances are distinguished by their
ving a sapid taste and are more or less soluble
water —

imple saline substances are Acids and Alkalies;
se mixed are simple compound saline substances;
t where one Acid and two Alkalies or one Alkali
d two Acids are mixed, they are then called triple
pound saline substances —

kalies are Urinous to the taste, and change
Vegetable Blue to Green —

e Vegetable Acids are far inferior in their
tiseptic properties to the Mineral Acids —

compound of Acids are now named from the Acid
ployed, and not from the compound used, as was
merly the case. —

# Of Acids

Acids exist in different states, some being fluid, others aeriform, and some solid, those in a fluid state are combined with water. Acids consist of a radical or basis, oxygen being necessary. That basis and the radicals are either simple or compound. The weakest acids, that is when impregnated with oxygen minus have ous added to the word, as Sulphurous Acid, and when oxygen plus, have ic added, as Sulphuric Acid. —

# Of the Sulphuric Acid

The most economical way of preparing the Sulphuric Acid is by deflagrating Sulphur with Nitre —

The more rapid the process of burning is, (which is increased by adding a larger proportion of Nitre) the stronger will be the Acid —

The names of this acid differs in proportion to the quantity of oxygen absorbed, when it has absorbed the greatest quantity it is capable of, it is then called Sulphuric acid, but when it has only rec^d a certain quantity it is called Sulphurous acid, & so with respect to other acids. —

In combination with *Alkalis* form for the moſt part what are called *Neutral Salts*; with *Earths* and *Metallic Oxyds*, *earthy* and *metallic Salts*.

Moſt of the acids *antiſeptic*. Some powerfully *corroſive*.

Conſiſt of *Inflammable Subſtances* united to the baſe of *Oxygen Gas*, the proportion of which determines the degree of *acidity*.

Uſually divided into *mineral*, *vegetable*, and *animal*, according to the ſources from whence they are moſt abundantly obtained.

The *mineral Acids* are the *Sulphuric*, *Nitric*, *Muriatic*, *Carbonic*, *Fluoric*, *Boracic*, *Succinic*, *Arſenic*, *Tungſtenic*, and *Molybdenic*.

## *Of the Sulphuric* or *Vitriolic Acid.*

Obtained from the burning of *Sulphur*, and diſtillation of *Sulphate* of *Iron*.

Concentrated afterwards by *boiling*.

When pure, *limpid*, *ponderous*, *unctuous*, *inodorous* and intenſely *ſour*.

Has a powerful attraction for *Moiſture*, and on mixture with *Water* occaſions an increaſe of temperature.

*Freezes* moſt eaſily when concentrated.

Unites intimately with *Alkalis*, producing with the vegetable, *Sulphate* of *Potaſh* (*Kali Vitriolatum* P. L.), with the mineral, *Sulphate* of *Soda* (*Natron Vitriolatum* P. L.), and with the volatile, *Sulphate* of *Ammoniac*.

With the *Earths*, *Sulphate* of *Baryt*, of *Lime*, of *Magneſia* (*Magneſia Vitriolata* P. L.), &c.

With *Metals*, *Sulphate* of *Zinc* (*Zincum Vitriolatum* P. L.), *Sulphate* of *Copper* (*Cuprum Vitriolatum* P. L.), &c.

May be deprived of a portion of its *Oxygen* by treatment with *Inflammable Subſtances* converting it into *Sulphureous acid Gas*, or totally decompoſed and reduced to the form of *Sulphur*.

The properties of *Sulphureous acid Gas* in many reſpects different from thoſe of *Sulphuric Acid*. Its compounds therefore denominated *Sulphites*.

The *Sulphuric Acid* ſuperior to moſt others in reſpect to its *Power* of *Attraction*, and stands about the 17th in the order of attraction.

The

# Of Sulphuric Acid

phurous Acid is formed by the slow combustion of the redients, but when the combustion is rapid Sulphuric id is formed.—

s Acid has no effect on the colour of Indigo.—

dependently of its Water, supposed to consist of Parts of Sulphur and 29 of Oxygen.—

# Of Nitric Acid

This acid generally contains a quantity of the Sulphuric or Muriatic acid, the existence of the muriatic may be known by the addition of Nitrate of Silver, and then the sulphuric by adding to it a quantity of Muriat of Barytes. If it contains either of these the liquor becomes turbid. —

This Acid is in many respects analogous to the Sulphuric Acid. —

The Radical of Nitric Acid is Azote, and when they are combined in a small degree, Atmospheric air is the result, when the proportion of Oxygen is encreased, Nitrous Oxyd, in a greater proportion, Nitrous Acid Gas, in a still greater, Nitrous Acid, and when impregnated to the utmost Nitric Acid. —

Nitrous Acid gas is decomposed by any substance which has a greater attraction for Oxygen that Azote. —

In a large way Nitric Acid is formed with Green Vitriol and Nitrate of Potash, or by mixing clay with Nitrate of Potash. —

The only difference between Nitrous Acid and Nitric Acid, is the Nitrous Acid containing a quantity of Nitrous Gas —

Nitric Acid with two parts of water is called double Aqua fortis, and if an equal quantity of water is added to this it is called single Aqua fortis. —

Nitrous gas having an Electric shock passed through it forms Nitrous Oxyd and Oxygen. —

By adding Sulphur or Phosphorous to Nitric Acid it is decomposed, and the Sulphuric or Phosphoric acid is formed, while the Nitrous gas passes off in fumes. —

Nitrate of Silver lapped up in tinfoil will remain a little time and throw out flame, combustion taking place. —

The *order* of its *Attraction* is *Baryt*, *Potaſh*, *Soda*, *Lime*, *Magneſia*, *Ammoniac*, *Alumine*, *Metallic Oxyds*, *Water*, *Spirit*.

Employed principally in *Dying*, *Bleaching*, *Tanning*, *Purification* of *Oils*, and in *Medicine*.

## *Of Nitric Acid.*

Obtained from the decompoſition of *Nitrate* of *Potaſh* by *Sulphuric Acid*, by de-aqueated *Sulphate of Iron*, or *Alumine*.

Purified by re-diſtilling from a freſh portion of *Nitre*, or by the addition of *Nitrate of Silver*.

In its common form, of a *yellowiſh* or *orange* colour. When pure, altogether *colourleſs*.

More *volatile* and leſs *ponderous* than *Sulphuric Acid*. Its *Acidity* equally intenſe.

Attracts *Moiſture* alſo from the atmoſphere, and unites readily with *Water*; but produces with it a leſs degree of *Heat*.

Deſtructive more immediately than the *Sulphuric Acid* of the life and texture of bodies to which it is applied.

By union with *Sulphuric Acid* acquires new properties, *Aqua Regina.*

By its union with the *Alkalis* produces *Nitrate of Potaſh* (*Nitrum* P. L ) *Nitrate of Soda, Nitrate of Ammoniac.*

With *Earths, Nitrate of Baryt, Nitrate of Lime, &c.*

With *Metals, Nitrate of Zinc, Nitrate of Iron, &c.*

In diſſolving *Metals,* is partially decompoſed and converted into *Nitrous Gas,* which on mixture with *Oxygen Gas,* reproduces *Nitric Acid,* and has many other remarkable properties.

Many of the *Inflammable Subſtances* produce a ſimilar effect.

Some decompoſe it more completely; and by the ſeparation of its *Oxygen* occaſion actual *Inflammation.*

Decompoſed alſo by expoſure to *Light,* as well as by the application of *Heat.* The product *Oxygen Gas,* with a certain admixture of *Azotic Gas.* Theſe therefore conſidered as the elements of *Nitric Acid.*

By different modes of combination they may be made to reproduce it.

The

# Of Muriatic Acid

By taking common salt 8 parts and adding to it a quantity of the Sulphuric acid 5 parts, the muriatic acid gas will be evolved, and when water is impregnated with this gas the acid in question is formed.—

This acid if applyed to the skin produces heat and redness, and if the parts are very tender blister will arise.—

Muriatic Gas melts Ice nearly as readily as a hot Iron.—

This Gas gives a brightish green tinge to flame, and is more readily absorbed in cold than in hot water.—

The muriates are very soluble in water.—

The purity of Muriatic acid is known by adding muriate of Barytes, for if it contains Sulphuric acid the liquor becomes turbid, not otherwise.—

This Gas turns all the colours of Flowers white except yellow. It also turns Rags, Paper, writing Ink, Wine. Bee Wax may be bleached white as may also Bones in the oxy muriatic acid gas.—

Water absorbes but a small proportion of this acid.—

x This may be prepared by mixing muriatic acid gas with the ammoniacal gas, when the salt becomes deposited upon the sides of the vessel, an increase of temperature takes place, which is always the case when gaseous matter becomes solid.—

Antimony drop into muriatic gas detonates with a thick white cloud, Ether drop into it, and a match held over the top produces instant combustion.—

Other acids turn vegetable blue colours Red, while this turns them white.—

To fumigate Rooms, or clothes, put three parts of Common Salt, two of Sulphuric acid, and one of the black oxyd of manganese in a Retort, and apply the heat of a Spirit Lamp to them, if they are clothes they ought previously to have been washed in a weak solution of Alkali.—

The *order* of *attraction* of this acid the ſame as that of the *Sulphuric.*

Chief uſes in *Dying*, *Etching*, and *Aſſaying*; and ſometimes, though rarely, in *Medicine.* But now in very general use

## *Of Muriatic Acid.*

Obtained by decompoſing *Muriate* of *Soda* (common or ſea ſalt) by means ſimilar to thoſe employed in the preparation of *Nitric Acid.*

purest Form *gaſſeous.*

In this ſtate is readily abſorbed by water, increaſing both its temperature and bulk, and communicating to it the general properties of an *Acid* (*Acidum Muriaticum*, P. L.).

In union with *Alkalis* forms *Muriate* of *Potaſh*; *Muriate* of *Soda* (*Sal Muriaticus*, P. L.) and *Muriate* of *Ammoniac* (*Sal Ammoniacus*, P. L.).

With *Earths*, *Muriate* of *Baryt*, of *Lime*, &c.

With *Metals*, *Muriate* of *Zinc*, of *Iron*, &c.

With ſome of the *Metals*, as *Zinc* and *Iron*, and ſome of the *Inflammable Subſtances*, as *Alcohol*, *Eſſential Oils*, *Phoſphorus*, &c. it produces *Hydrogen Gas.*

On diſtillation from certain *metallic Oxyds*, it unites with their *Oxygen*, and acquires thereby a ſingular alteration in its properties. *Oxy-muriatic Acid, Aqua regia.*

Remarkable in this form for its effects on animal and vegetable colours; hence its preſent application in *Bleaching*.

The affinity of *Muriatic Acid* in moſt inſtances weaker than that of either the *Sulphuric* or *Nitric*; but the order of its attraction the ſame.

*Baſis* as yet unknown.

Employed principally in *Medicine*, *Bleaching*, *Dying*, and *Aſſaying*.

## Of Carbonic Acid.

*Sources* of this *Acid* various.

Uſually collected in a [illegible] form from bodies undergoing the *vinous Fermentation*; or from *Carbonated Earths* or *Alkalis*, by the application of *Heat*, or more commonly by the addition of an *Acid* of ſuperior attraction.

Specifically *heavier* than atmoſpherical air, nearly as 2 to 1. hence so frequently found in Mines, Caverns and Grotto's.

In

# Of Muriatic Acid

nost remarkable alteration takes place in this acid en brought into union with the brown, or black cal- nangatese. Mr Shield found upon pouring this acid on powdered oxyd of mangalese, and submitting it to a ficient degree of heat, that a new compound was produced, ich was brought about by the acid absorbing a ater quantity of Oxygen, therefore it ought to be called riatic acid, and the present muriatic acid muriatous d, for the same reason as one is called Nitric, the other rous acid, for the only difference here is the oxy muriatic d containg a great proportion of Oxygen. This acid may derived from the other different oxyds, but not so expe= tously. It is capable of dissolving gold and platana which not be done by any other substance excepting Regia, ich is this acid formed in a different manner.—

# Of Carbonic Acid

lled also ariform acid or fixed air, it being gaseous, is found in the air in every case without exception t has undgone respiration, it is found also in subter= raneous situations, in different springs communicating them properties that are highly beneficial in disease.—
Earthy or mettalic bodies this acid unites with are lled mild, they being rendered so by the mixture.—
this acid we have two forms the Carbonic acid gas, and Carbonic acid, the latter being formed by making te absorbe the Carbonic acid gas.—
bonic acid is Carbon in combination with Oxygen, and heat that can be applied is capable of reducing bonic acid gas to a fluid form, nor any pressure will [illegible] to it.—
Gas reddens Litmus.—

## *Of Fluoric Acid.*

Obtained by decompoſing *Fluate* of *Lime* by means of the *Sulphuric Acid.*

Form *gaſſeous.*

*Heavier* than atmoſpherical air, as 1.5 to 1. *Cauſtic.*—*Azotic.*

Unites readily with *Water,* and renders it intenſely ſour.

In union with the *Alkalis,* forms compounds of a gelatinous conſiſtence.

Poſſeſſes the remarkable property of diſſolving and volatilizing *Silex.*

Diſſolves *Zinc, Iron,* and *Copper*; the other metals not acted on, unleſs in the ſtate of *Oxyds.*

*Baſis* unknown.

Order of Attraction, *Lime, Baryt, Magneſia, Potaſh, Soda, Ammoniac, Alumine, metallic Oxyds, Water, Spirit.*

Uſe—*Etching on Glaſs.*

# Fluoric acid.

The experiments of Mr Priest have shown it to be composed of calcareous Earth or Lime in union with the acid in question, the most curious and important property of this acid, is that it is a menstruum for flinty earth or Silex, which no other acid we are yet acquainted is, therefore when you prepare this acid it comes over in a gelatinous form, which is caused by its uniting with the Silex contained in the glass vessel you are carrying on the experiment with.—

When absorbed in Spt of Wine and set fire to, it gives out a beautiful green flame.—

The Radical of this acid is not known, nor is it ascertained whether it contains any Oxygen or no. It extinguishes light flame and is noxious to those Animals that are made to breathe it.—

With this acid petrifactions might be made, for upon moist bodies being brought into it a deposit of Silicious Earth takes place upon their surface.—

This acid gas gives a roughness to glass and is used in etching upon glass, you first cover the surface of the glass with wax and then make your impressions down upon the glass, and then pour this acid into these hollows.—

With a slight degree of heat this acid is Phosphorescent.—

# Boracic Acid

When this acid is used in soldering it goes into a state of glaſs becoming vitrified. it therefore acts in two ways, first by defending the metal, preventing it oxydating but if any does become oxydated it unites with it, converting it also into a state of glaſs.—

## *Of Boracic Acid.*

called formerly Sedative Salt.

Found in ſolution in the water of certain *Lakes*; or obtained artificially, by decompoſing *Borate* of *Soda* by *Sulphuric Acid*; or by ſublimation with *Sulphate* of *Iron.*

Form *concrete*, *ſcaly*; *Semi-tranſparent*, and of a *pearly luſtre*, in its native saline

Sparingly ſoluble in *Water*; more ſo in *Alcohol*, to the flame of which it comunicates a greeniſh tinge.

When united with *Water* eaſily ſublimed.

Fuſible without addition into a tranſparent *Glaſs*.

Forms, with *Potaſh*, *Borate* of *Potaſh*; with *Soda*, *Borate* of *Soda* (*Common Borax*); &c.

With *Lime*, *Borate* of *Lime*, &c.

*Baſis* unknown.

Order of Attraction, *Lime*, *Baryt*, *Magneſia*, *Potaſh*, *Soda*, *Ammoniac*, *Alumine*, *metallic Oxyds*, *Water*, *Spirit*.

Suppoſed by the diſcoverer Homberg to poſſeſs peculiar *ſedative* powers, and hence called by him *ſedative ſalt.*

## *Of Succinic Acid.*

Obtained from *Amber* by diſtillation without addition.

Freed from *Empyreumatic Oil*, and rendered colourleſs, by rediſtillation; by ſolution and filtration; by ſolution in muriatic acid; or, by detonation with *Nitre.*

Readily ſoluble in *cold Water*, ſtill more ſo in *boiling Water* or in *Spirit.*

Form *concrete*, conſiſting of minute triangular priſms, truncated at their apices.

Unites with the *Alkalis*, *Earths*, and *metallic Oxyds*, forming with them compounds, the properties of which have as yet been little enquired into.

*Baſis* not aſcertained.

Order of attraction—*Baryt*, *Lime*, *Magneſia*, *Potaſh*, *Soda*, *Ammoniac*, *Alumine*, *metallic Oxyds*, *Water*, *Spirit.*

Uſe confined to medicine.

# *Of Arſenic Acid.*

Obtained by the acidification of common *Oxyd* of *Arſenic* by treatment with the *Nitric* or *Oxymuriatic Acid*; *Nitrate* of *Ammoniac*; or other ſubſtances capable of furniſhing *Oxygen.*

Form *concrete.*

Pretty readily ſoluble in *Water.* Melts into a tranſparent *Glaſs,* which on cooling becomes opake.

By the continued application of heat may be reduced into the form of *Oxyd.*

Combines with the *Alkalis* in certain proportions, and forms with them cryſtalliſable ſalts. *Arſeniate* of *Potaſh* (*Macquer's Arſenical Salt*), &c.

Combines alſo with moſt of the *Earths.*

Acts on ſeveral *Metals,* as *Zinc,* and *Iron*; and enters into union with moſt of the metallic *Oxyds*: *Arſeniate of Copper* (*Scheele's green Pigment*); &c.

In the dry way decompoſes many of the compound ſalts, as *Sulphate* of *Potaſh,* of *Soda,* &c.

By diſtillation with *Charcoal*, or digeſtion with *Turpentine*, *Expreſſed Oils*, or *Sugar*, may be completely deprived of its *Oxygen*, and reduced to a *Regulus*.

Unites readily with *Sulphur*.

Order of Attraction, *Lime*, *Baryt*, *Magneſia*, *Potaſh*, *Soda*, *Ammoniac*, *Alumine*, *metallic Oxyds*, *Water*, *Spirit*.

Medical properties nearly the ſame as thoſe of the *white Oxyd*, or common arſenic.

## *Of Tungſtic Acid.*

Obtained from the mineral ſubſtances *Tungſten* and *Wolfram*, by fuſion with *Carbonate* of *Potaſh*, ſolution in *Water*, and addition of *Nitric Acid*; or by alternate digeſtion in *Nitric* or *Muriatic Acid*, and *Ammoniac*, and ſubſequent application of heat.

Form *pulverulent*.—Colour *yellow*. Specific gravity 6, 12.—*Inſipid*.—*Inſoluble*.

Infuſible per ſe, but with *Phoſphate* of *Soda*; and *Ammoniac*, forms a blue, and with *Borate* of *Soda*, a browniſh-yellow glaſs.

Form, *pulverulent.*—Colour *white.*—Taſte *metallic.*—Specific gravity 3, 46.

Of little ſolubility in *Water*, more ſoluble in *Sulphuric Acid*, ſtill more ſo in the *Muriatic*; the two laſt of which on cooling acquire a blue colour.

Sublimes into white flowers under the joint application of *Heat* and *Air.*

Unites with *Potaſh*, and forms a ſalt, cryſtalliſable by evaporation—With *Ammoniac* one which parts with its alkali in a gentle heat.

With *Baryt*, *Lime*, and *Magneſia*, ſalts ſparingly ſoluble in water.

Diſſolves ſeveral *Metals.* By fuſion with ſome of them, as *Iron*, *Copper*, and *Silver*, forms friable compounds. Alſo precipitates ſeveral of the metallic ſolutions, as *Nitrate of Silver*, *Quickſilver*, &c.

In the dry way, decompoſes ſeveral of the *Neutral ſalts.*

By union with *Sulphur* it regenerates *Molybdena.*

May be metallized by mixture with *Oil*, and application of an intenſe degree of *Heat.*

Order of attraction not yet aſcertained.

The

# Acetic Acid

The Radical of this acid is Carbone and Hydrogen, and this is the radical of all the vegetable acids, being in greater or leſs quantities.—

Some think there is no difference between Acetous and Acetic acid.—

In order to distinguish whether it contains any Sulphuric acid add to it Acetate of Baryt.—

Two parts of strong Acetous Acid added to one part of Spt of Wine which had previously had oil of Cloves or other aromatic diſsolved in it, form the aromatic Vinegar.—

The *Vegetable Acids* are, the *Acetic*, *Tartareous*, *Pyro-tartareous*, *Oxalic*, *Gallic*, *Citric*, *Malic*, *Benzoic*, *Pyro-ligneous*, *Pyro-mucous*, and *Camphoric*.

## *Of Acetic Acid.*

Obtained by the ſimple diſtillation of *Acetite of Copper* (*Acidum Acetoſum* P. L.), or by decompoſing *Acetite* of *Potaſh* by the *Sulphuric Acid*.

Form, *liquid*—*Colourleſs*.

Contains a larger proportion of *Oxygen* than the *Acetous Acid* or vinegar, and therefore of greater acidity.

Of the preparation of the *Acetous Acid* from different vinous liquors, and the circumſtances which more eſpecially promote it.

The *Colour*, *Acidity*, and other properties of this, depend chiefly on the material from which it is obtained. Uſually of a ſharp ſour taſte, and ſpirituous acid odour.

By keeping loſes its *acidity*, becoming thick and putrid. The *Heat* of *boiling Water* counteracts theſe changes.

Moſt conveniently *purified* by cautious diſtillation in veſſels of glaſs.

The higher degrees of heat decompoſe it.

May be *concentrated* by freezing.

Forms with *Potaſh*, *Acetite of Potaſh* (*Kali Acetatum* P. L ), with *Ammoniac*, *Acetite of Ammoniac* (*Aqua Ammoniæ Acetatæ* P. L.).

Diſſolves moſt of the *Earths*.

Diſſolves alſo moſt of the *metallic Oxyds*, producing with *Lead*, *Acetite of Lead* (*Ceruſſa acetata* P. L.); with *Copper*, *Acetite of Copper* (*Aerugo* P. L.), with *Quickſilver*, in the *acetic* form, *Acetate of Quickſilver* (*Hydrargyrus Acetatus* P. L.).

*Gums*, *Gum-reſins*, vegetable eſſential *Salts* and *Extracts* ſoluble in *acetous Acid*; hence its extenſive application in pharmacy.

Appears to be a compound of *Carbon* and *Hydrogen* in union with *Oxygen*.

Order of Attraction, *Baryt*, *Potaſh*, *Soda*, *Ammoniac*, *Lime*, *Magneſia*, *Alumine*, *metallic Oxyds*, *Water*, *Spirit*.

Employed in the arts, as in *Dying* and *Printing*, and alſo extenſively for *dietetic* and *medical* purpoſes.

## *Of Tartareous Acid.*

Obtained from *Acidulous Tartrite of Potaſh* by means of *Lime*, or *Carbonate of Lime*, and the ſubſequent addition of *Sulphuric Acid* (*Acidum Tartari cryſtalliſatum* P. Suec.). May alſo be prepared by the *Sulphuric Acid* alone.

Cryſtalliſes in ſmall tranſparent ſcales or needles. Not altered by expoſure to *Air*. Readily ſoluble in *Water*, and of an agreeably acid taſte.

Eaſily decompoſed by *Heat*.

Yields *Oxalic Acid* by treatment with the *Nitric*; and *Acetous* by digeſtion with *Water* and *Spirit*.

In union with *Potaſh* forms, according to the proportions, *Tartrite of Potaſh* (*Kali Tartariſatum* P. L.), or *acidulous Tartrite of Potaſh* (*Cremor Tartari* P. L.), and with *Soda*, *Tartrite of Soda* (*Natron Tartariſatum*, P. L.)

Diſſolves *Lime*, *Magneſia*, and *Alumine*.

Diſſolves alſo ſeveral of the *metallic Oxyds*, and precipitates many of them from their ſolutions in other *Acids*.

Differs only from the foregoing in the proportion of its *Oxygen.*

Order of Attraction, *Lime*, *Baryt*, *Magneſia*, *Potaſh*, *Soda*, *Ammoniac*, *Alumine*, *metallic Oxyds*, *Water*, *Spirit.*

Uſe confined to *Medicine.*

## *Of Pyro-tartarcous Acid.*

Obtained from *acidulous Tartrite of Potaſh*, or the *Tartareous Acid* by diſtillation with a ſtrong *Heat.*

Form, *liquid.*—Taſte, *empyreumatic.*

Rediſtillation dangerous, from the ſudden evolution of elaſtic matter.

Compounds of this *acid* not as yet examined.

## *Of Oxalic Acid.*

Obtained from *Sugar*, *Malt*, *Galls*, and various other ſubſtances, by treating them with *Nitric Acid.*

Form *concrete.* Cryſtalliſes into tranſparent quadrangular *Needles.* Taſte very *acid.*

## Oxalic Acid

In preparing this acid the Nitric Acid is decomposed and the Acid which remains is only the pure acidifiable principle, we therefore can obtain it from a great variety of substances. —

Readily ſoluble in *Water*: ſoluble alſo, and without decompoſition, in the *Sulphuric* and other *Acids*, *Spirit of Wine*, *Æther*, *eſſential*, and *expreſſed Oils*.

Eaſily decompoſed under the application of the higher degrees of *Heat*.

Forms peculiar compounds with the *Alkalis*, with moſt of the *Earths*, and with ſeveral of the *metallic Oxyds*.

Is more eſpecially remarkable for its affinity with *Lime*, with which it produces an inſoluble compound. hence, an excellent test of its presence

Would appear to conſiſt of the ſame elements with the former *Acids*, but in different proportions.

Order of Attraction, *Lime*, *Baryt*, *Magneſia*, *Potaſh*, *Soda*, *Ammoniac*, *Alumine*, *metallic Oxyds*, *Water*, *Spirit*.

Uſed to take out *Iron-moulds*, and as a teſt for diſcovering the preſence of *Lime*.

## *Of Gallic Acid.*

Obtained from *Infuſion* of *Galls*, by continued expoſure to *Air*, edulcoration of the *Precipitate* which takes place, and ſubſequent *Cryſtalliſation*.

Forms

Forms ſmall granular or needle-like *Cryſtals*, of a ſour but not aſtringent *Taſte*.

More ſoluble in *Spirit* than in *Water*.

Burns in the open fire, leaving behind a hard inſoluble *Charcoal*.

In cloſe veſſels, yields an *acid Liquor* and a *whitiſh ſaline Sublimate*.

A ſimilar ſalt procurable from Galls, by *ſimple Diſtillation*. This alſo called *Gallic Acid*.

Remarkable for the property of producing a black colour with *Iron* and its ſolutions; hence the formation of *Ink*.

*Hydro-carbon* probably the baſis of both theſe forms of *Gallic Acid*, but united with different proportions of *Oxygen*.

## *Of Citric Acid.*

Obtained from the juice of *Lemons*, *Citrons*, and other fruits, by a proceſs ſimilar to that employed for the preparation of *Tartareous Acid* from the *acidulous Tartrite of Potaſh* by *Lime*; or by congelation on expoſure to intenſe degrees of *Cold*.

The goodneſs of Ink depends upon its being brought to the point of saturation with Iron, for if the Iron be in exceſs it becomes of a dirty brown colour. The reason of the durability of the Ink of the ancients, was that the colour had for its basis Charcoal. The best Ink is made by adding to the ingrediants White wine Vinegar instead of water, and a small quantity of Logwood with Verdigrease but this is decomposed when exposed to Iron.—

Form *concrete.* *Cryſtalliſable.*

Not ſubject to alteration by keeping. Forms particular compounds with the *Alkalis* and moſt of the *Earths.*

Action on *Metals* not remarkable.

Convertible by means of the *Nitric*, into *Oxalic* or *Acetic Acid.*

Order of Attraction, *Lime*, *Baryt*, *Magneſia*, *Potaſh*, *Soda*, *Ammoniac*, *Alumine*, *metallic Oxyds*, *Water*, *Spirit.*

Uſes, in the more common form, in *Diet* and *Medicine.*

## *Of Malic Acid.*

Obtained from the juice of *Apples*, and other *Fruits*, by ſaturating it with *Potaſh*, adding to the compound a ſolution of *Acetite of Lead*, and decompoſing the *Malate of Lead*, thus produced, by *diluted Sulphuric Acid.*

Form *liquid.* Taſte *agreeably acid.*

In union with *Alkalis*, forms *deliqueſcent Salts.* Unites alſo with moſt of the *Earths.*

Upon *Metals*, excepting *Iron* and *Zinc*, has no remarkable effect.

Is eaſily convertible into *Oxalic* or *Acetic Acid*, by treatment with the *Nitric*.

Conſidered as intermediate between *Tartareous* and *Oxalic Acid*.

## *Of Benzoic Acid.*

Obtained in the dry way, by ſublimation from *Gum Benzoin* (*Flores Benzoes* P. L.); or, in the moiſt way, by mixing and boiling it with *Lime*, filtering the liquor, and adding *Muriatic Acid*.

Form *minutely cryſtalline*. Taſte *indiſtinctly acid*.

Soluble both in *Water* and *Spirit*, alſo in different *Acids*, and without being decompoſed.

Melts in *cloſe Veſſels*; and burns in the *open Fire*. Unites into cryſtalliſable compounds with the *Alkalis* and ſeveral of the *Earths*.

Neither the *Order of Attraction*, nor the *Compoſition* of this acid, as yet ſufficiently aſcertained.

## *Of Pyro-ligneous Acid.*

Obtained by diſtillation, from *Birch*, *Beech*, and many other woods.

Form *liquid.* Taſte *acid.* Specific gravity 49 to 48.

Decompoſes in the open *Fire.*

Unites with *Alkalis*, *Earths*, and *Metals.*

Order of Attraction, *Lime*, *Baryt*, *Potaſh*, *Soda*, *Magneſia*, *Ammoniac*, *metallic Oxyds*, *Alumine*, *Water*, *Spirit.*

Radical of this acid *Hydrogen* and *Carbon.*

## *Of Pyro-mucous Acid.*

Obtained by diſtilling *ſaccharine Subſtances* in a ſtrong heat; rediſtilling the liquid product, and afterwards concentrating it by *freezing.*

Taſte *very penetrating.* Colour *yellowiſh.*

Unites with the *Alkalis*, *Earths* and *Metals.*

Order of Attraction, *Potaſh*, *Soda*, *Baryt*, *Lime*, *Magneſia*,

*Magneſia*, *Ammoniac*, *Alumine*, *metallic Oxyds*, *Water*, *Spirit*.

Conſiſts chiefly of water and oil ſlightly *oxygenated*.

Convertible by the *Nitric*, into *Oxalic* or *Malic Acid*.

## *Of Camphoric Acid.*

Obtained by the diſtillation of *Nitric acid* from *Camphor*.

Forms *ſilver-white parallelopiped Cryſtals*. Taſte *bitteriſh*, *ſour*.

Soluble in *Water*, inſoluble in *Spirit*.

Unites with the *Alkalis*, *Earths*, and *Metals*.

Thought to have the ſame baſis as *Oxalic Acid*.

The *animal Acids* are, the *Phoſphoric*, *Lactic*, *Saccho-lactic*, *Formic*, *Pruſſic*, *Sebacic*, *Lithic*, and *Bombic*.

and when in a state of glaſs if it be exposed to the air or put into water for any length of time; it again aſsumes its acid form. —

## *Of Phoſphoric Acid.*

Sources of this acid various. Modes of obtaining it various alſo. Uſually procured from common *Phoſphorus*, by deflagration; or by ſlow combuſtion, under long expoſure to air; or by treatment with the *Nitric Acid.*

Cryſtalliſes into quadrangular *Priſms.* Taſte *acid*, but not *corroſive.* Specific gravity 2,687.

Has a ſtrong attraction for *Moiſture*, producing heat.

Under the application of the higher degrees of *Heat*, fuſes into a tranſparent *Glaſs.*

With the *Alkalis*, *Earths*, and *Metals*, forms particular compounds. With *Soda*, *Phoſphate of Soda* (*Soda Phoſphorata* P. Edin.). With *Silex*, in the dry way, a deliqueſcent glaſs. With *Iron*, *Phoſphate of Iron (cold ſhort Iron).*

May be partially or totally decompoſed, by treatment with different *inflammable Subſtances.*

In diſtillation with *Charcoal*, reproduces *Phoſphorus*; this therefore conſidered as its *Radical.*

Order of Attraction, *Lime, Baryt, Magneſia, Potaſh, Soda, Ammoniac, Alumine, metallic Oxyds, Water, Spirit.*

## *Of Lactic Acid.*

Obtained from *ſour Whey*, by evaporating it to a certain point, filtering, adding firſt *Lime-water*, and afterwards *Oxalic Acid*, ſeparating the *Oxalate of Lime* by decantation, evaporating the decanted liquor to the conſiſtence of honey, diſſolving in *Alcohol*, adding *Water*, and drawing off the ſpirit by diſtillation.

Form *liquid.*

Eaſily decompoſed by *Heat*. With the *ſaliſiable Baſes* forms compounds which do not cryſtalliſe.

Would ſeem analogous to *Acetous Acid*. Order of Attraction the ſame.

## *Of Saccho-lactic Acid.*

Obtained from *Sugar of Milk* and other ſubſtances, by treatment with the *Nitric Acid* in a ſimilar manner to that employed in the preparation of *Oxalic Acid.*

Form *pulverulent.* Colour *white.*

Sparingly ſoluble in *Water.*

Decompoſed by expoſure to *Heat.*

Forms cryſtalliſable compounds with the *Alkalis*; but with the *Earths* and *metallic Oxyds*, ſuch as are inſoluble in water.

Order of Attraction, *Lime, Baryt, Magneſia, Potaſh, Soda, Ammoniac, Alumine, metallic Oxyds, Water, Spirit.*

## *Of Formic Acid.*

An acid liquor ſecreted by *Ants*, more eſpecially the *Formicæ rufæ Lin.* May be collected by expreſſion; or cautious ſimple diſtillation; or by infuſing them in *Water*, or *Spirit*, and ſubſequent diſtillation of the liquor, which may be concentrated by expoſure to *Cold.*

Has a *pungent Smell*, and when diluted, a taſte *agreeably Acid.*

Forms particular compounds, with the *Alkalis, Earths*, and *metallic Oxyds.*

Order of attraction, *Baryt, Potaſh, Soda, Lime, Magneſia, Ammoniac, Alumine, metallic Oxyds, Water, Spirit.*

## *Of Pruſſic Acid.*

Obtained from *Pruſſiate of Iron (Pruſſian Blue)* by boiling it in a ſolution of *Potaſh*, adding *Sulphuric Acid* to the liquor when filtered, and ſubmitting it to diſtillation; or by diſtilling a mixture of *Pruſſiate of Potaſh*, and diluted *Sulphuric Acid*, and rediſtilling the product from *Carbonate of Lime.*

Form *gaſeous.*

Unites readily with *Water.*

Combines with *Alkalis, Earths*, and *metallic Oxyds.* With *Oxyd* of *Iron* reproduces *Pruſſian Blue.*

Conſiſts of the ſame elements as *Carbonate* of *Ammoniac.*

Order of Attraction, *Potaſh, Soda, Ammoniac, Lime, Baryt, Magneſia, metallic Oxyds, Water, Spirit.* In later Experiments it has been found that Baryt should be placed before [illegible].

Of

of Prussic Acid

The acid precipitates Lead Antimony and a variety of other metals, white. Iron Blue, and Copper of a red brown colour.—

It precipitates all the metals and leaves their Earth, except Baryt.—

The Prussiate of Lime is a delicate test of the presence of Iron.—

## *Of Sebacic Acid.*

Obtained from *animal Fat*, by ſimple diſtillation, or in a more pure form by melting *fatty Matter* with *Lime*, boiling the mixture in *Water*, and decompoſing the cryſtalliſable ſalt *(Sebate of Lime)* thus procured, by the addition of *Sulphuric Acid* and ſubſequent diſtillation.

Form *liquid.*

In ſeveral reſpects analogous to the *Muriatic Acid.*

With the *Alkalis*, *Earths*, and *metallic Oxyds*, forms peculiar compounds.

Order of Attraction, *Lime*, *Baryt*, *Magneſia*, *Potaſh*, *Soda*, *Ammoniac*, *Alumine*, *metallic Oxyds*, *Water*, *Spirit.*

## *Of Lithic Acid.*

Obtained from the ſimple diſtillation of *Urinary Calculus.*

Form *concrete.*

Difficultly ſoluble in *Water*.

Forms with the *Alkalis*, *Earths*, and *metallic Oxyds*, compounds as yet but little known.

## *Of Bombic Acid.*

Obtained by expreſſion, or infuſion in *Alcohol*, from the *Silk Worm*, when in the ſtate of *Chryſalis*.

Form *liquid*. Taſte *penetratingly acid*. Colour *yellow*.

Combinations not yet examined.

## OF ALKALIS.

Diſtinguiſhed, by being of a pungent, lixivial, or urinous taſte, and changing moſt vegetable *blue* colours to *green*, and many of the *yellows* to *brown*.

Have, like moſt of the acids, a ſtrong attraction for *moiſture*.

They manifeſt alſo an extenſive diſpoſition to union

## Of Alkalies

If you wish to render an Alkali Caustic, take any quantity of it and three or four times its quantity of Quick lime fresh prepared, then pouring upon these a sufficient quantity of hot water to give it a plaistic form, then let it stand three or four hours, then pour upon it more water, then try it with the Sulphuric Acid and if no effervescence takes place you may be certain that it is pure. After this it should be decanted off through gravel; and sand laid upon it, then pour the liquor upon it, and it will paſs through more pure than any other way — It is much more fusible in its Caustic state, than in its Carbonated —

## Of Alkalies

Potash and Soda are to be considered as simple bodies, while Ammonia is known to be a compound.—

[illegible] [illegible] are able [illegible] [illegible] [illegible] under the head of [illegible].—

They precipitate from their solutions most of the Earths, and all the Metallic Oxyds, several of which they are capable of redissolving.—

With unctious substances they form soaps; with Silex and Alumine various kinds of Glass, and Porcelain; with Sulphur Alkaline Hepars or Sulphurets.—

## Of the Vegetable Alkali..

It is not improbable but that certain constituent parts come together in the burning of Vegetables, tho' the Alkali may be obtained in the moist way.— When this Alkali is pure no effervescence takes place upon the addition of an Acid.—

In obtaining this Alkali by adding Lime to Carbonate it is produced by a more Elective attraction, for the Alkali parts with its Carbonic Acid gas and takes in it stead Caloric: therefore the Lime is rendered mild while the Alkali becomes exceedingly caustic.—

It restores Litmus paper blue after being turned red by an Acid.—

When the substances are burnt slow they yield the most Pot-ash, and when burnt in a close Vessel they hardly give you any Potash.—

The Salt of Tartar contains about 70 per cent of pure Caustic Alkali (Vegetable) The Best Pearl Ashes about 55. & Dantzig, 51 Ordinary 46.—

union with other bodies. With the acids, as before mentioned, they conſtitute *neutral Salts.*

With unctuous ſubſtances, they form *Soaps.*

They are uſually divided into *fixed* and *volatile.* The *fixed* ſubdivided into *vegetable* and *mineral.*

The *fixed* ſuſpected, the *volatile* known, to be compounded.

## *Of Vegetable Alkali. (Potaſh.)*

Appears to be a conſtituent part of moſt vegetable ſubſtances, enters alſo into the compoſition of ſeveral ſaline minerals. Obtained from *Carbonate of Potaſh*, by treatment with *Lime.*

Form *concrete.* Taſte extremely *pungent. Cauſtic.* Colour *white.*

Has a ſtrong attraction for *moiſture.*

On ſolution in water produces an increaſe of temperature (*Aqua Kali puri* P. L.).

Fuſible in a moderate, and volatile in an intenſe, *Heat.*

Promotes the fuſion of *Earthy Bodies* and of *metallic Oxyds*; hence the preparation of different kinds of *Glaſs*. Unites readily with all the *Acids*. and with Sulphur producing Sulphurets

Its more important compounds are,

1ſt. *Sulphate of Potaſh* (*Kali vitriolatum* P. L.), prepared uſually from the ſaline maſs, which remains after the diſtillation of *Nitric Acid*.—Form, *cryſtalline*.—Taſte, *ſaltiſh bitter*.—Difficultly ſoluble in water; alſo very difficult of fuſion.—May be decompoſed either in the moiſt way by *Baryt*, or in the dry way by calcination with *Charcoal*.—Application chiefly *medical*.

2d. *Nitrate of Potaſh* (*Kali Nitratum* P. L.) obtained in the Eaſt Indies and other countries by the elixation of certain ſoils, in which it is either already contained, or produced artificially by the addition of *Potaſh*.—Thoſe ſoils more eſpecially productive in which vegetable and animal matter have run into a ſtate of putrefaction.—Freed from extraneous ſaline matter by repeated cryſtalliſation.—Form of its cryſtals *priſmatic*.—Taſte, *cold*, *ſaline*, *penetrating*.—[illegible] Much more ſoluble in hot than cold water.—In a moderate heat undergoes watery fuſion (*Sal-prunel*).—An increaſe of the heat produces a decompoſition

The pulvis fulminans is made by mixing three parts of nitre, to two of Potash, and one of Sulphur—Gunpowder is made by mixing 75 parts of nitre to 15 of Charcoal and 10 of Sulphur—Count Rumford found that 12 grains of Gunpowder blew up a cannon that weighed 8000 pounds.—

# Of the Vegetable Alkali

lphet of Potash decomposes Water, forming Hydro-Sulphur=
ts.—
eautiful large Crystals may be formed of the neutral
lts, by adding Crystals to solutions which are just in the
ct of crystalizing, in this way you may by continuing
e process procure the largest and finest Crystals.—

0th This Salt crystallises most beautifully, being made up of
Double Pyramids, Base to Base each base having six faces.—

nd Gunpowder is a simple mixture of certain
roportions of Nitre, Sulphur, and Charcoal —
The goodness of Gunpowder depends upon the purity,
of all the Ingrediants and upon their proper mixing
for they cannot be mixed too much —
To make the powder granulated the mixture is
moistened with water and then passed through
Seives of different sizes —
To make it polished it is put into Casks, and
then given a rotatory motion —
The proportion of the ingrediants is not accurately
ascertained, as it depends upon the purity or
impurity of the Ingrediants, the proportion not
being the same in two Countries —
The Ingrediants of Gunpowder to be in the greatest
perfection must be kept perfectly dry —

[illegible]

Oxygen Gas is furnished most pure from the watery fusion of the Oxy-Muriat of Potash —

Oxy-muriate of Potash if mixed with Sulphur and Charcoal you will have a very dangerous preparation —

Oxy-muriat of Potash triturated with Sulphur you will have a violent explosion, but more so if mixed with Phosphorus in as dry a state as possible ———

By mixing any of the following substances with oxy muriat of Potash combustion will take place by touching them with strong Sulphuric Acid, Sugar, Gum arabic, Camphor and Black Lead, Indigo, Lamp black and Sulphur and Camphor. —

By the the following mixture you will have combustion with the Oxy Muriat of Potash Pour a quantity of Water upon a little oxy muriat of Potash, then drop in a few pieces of Phosphorus, and with a funnel pour a little of the strong Sulphuric Acid to the bottom of the Vessel when the Charcoal will become luminous in the Water. Next pour a quantity of Alcohol on oxy muriat of Potash and put in Phosphorus and by pouring strong Sulphuric Acid as before combustion will take place. Next pour [illegible] upon oxy muriat of Potash and adding the Sulphuric acid to the mixture combustion takes place, but the violentest combustion will be produced by putting oxy muriat of Potash into into oil of Turpentine: and then add to the mixture a strong Sulphuric acid. —

compoſition of its *Acid*; the *Alkali* remaining unchanged.—May be more readily decompoſed by the addition of *Charcoal* or other inflammable matter; hence the preparation of *Gun-powder*.—When decompoſed in the moiſt way, by treatment with the *Sulphuric*, furniſhes *Nitric Acid*.—Uſed extenſively in *Glaſs-making*; *Metallurgy*; preparation of *Gun-powder*; and for *dietetic* and *medical* purpoſes.

3d. *Acidulous Tartrite of Potaſh*, prepared from *crude Tartar* (the ſpontaneous depoſite from new wine) by ſolution, and evaporation (*Cremor Tartari* P. L.), or by cryſtalliſation under cooling (*Tartari Cryſtalli* P. L.).—Form *cryſtalline*.—Taſte agreeably *acid*. — Of little ſolubility in *Water*.—Decompoſed by the application of *Heat*; chief products, *Pyro-tartareous Acid*, and *Carbonate of Potaſh*, therefore called *Salt of Tartar*.—Of various application in the arts, as in *Tinning*, *Dying*, *Hat-making*; employed alſo extenſively in *Medicine*.

4th. *Tartrite of Potaſh* (*Kali Tartariſatum* P. L.), prepared from the ſolution of the former, either by precipitating its exceſs of acid, by means of *Chalk*, or by ſaturating it with additional *Potaſh*.

*Potaſh.*—Form, *cryſtalline.*—Taſte *ſaltiſh-bitter.*—Attracts moiſture from the atmoſphere; alſo very ſoluble in *water.*—Decompoſed by heat, nearly in the ſame way as the *Acidulous Tartrite of Potaſh.*—Employed only in medicine, as a *mild Cathartic.*

5th. *Acetite of Potaſh* (*Kali Acetatum* P. L.) prepared by ſaturating *Potaſh*, with *Diſtilled Vinegar*, evaporating to dryneſs, melting the remaining maſs, diſſolving it in water, filtering and evaporating a ſecond time.—Form, *flaky.*—Colour, *white.*—Taſte *pungent.*—*Deliqueſcent.*—Eaſily ſoluble both in *Water* and *Spirit.*—Its acid decompoſed in diſtillation.—Yields *Acetic Acid*, on the addition of the *Sulphuric.*—Uſed in medicine as a *Diuretic.*

6th. *Carbonate of Potaſh* (*Kali Præparatum* P. L.) uſually obtained from the aſhes of vegetables by lixiviating them in water, decanting, and evaporating to dryneſs.—Form *powdery.*—Taſte, *urinous.*—Colour, *pearly-white.*—*Deliqueſcent* in a moiſt atmoſphere (*Aqua Kali* P. L.); may then be cryſtalliſed after cautious evaporation.—May be decompoſed in the moiſt way by moſt of the other *Acids*, or by *Lime*, and in the dry way by the ſimple application of *Heat.*—

Of the Vegetable Alkali

## Of the Vegetable Alkali

## Of the Mineral Alkali

If you wish to obtain the Mineral Alkali basis, you must take the Natron Vitriolatum and powder it, then mix it with powdered Charcoal; after which it must be exposed to heat and Air —

This can only be distinguished from from pure Potash by its different affinities and Compounds for it possesses all the sensible properties of the Vegetable Potash. —

The Alkali manufactured at Liverpool contains about 40 per cent of its weight of Alkali in Crystals; at India 28, Best Alicant Barilla 26,2, Sicilian Barilla 2 Sicilest Kelp from Norway the Orkneys [illegible] [illegible] [illegible] 2

Uſes various, as in *Glaſs-making*, *Bleaching*, *Metallurgy*, *Medicine*, &c.

The order of attraction of this alkali in the moiſt way, *Sulphuric Acid*, *Nitric*, *Muriatic*, *Sebacic*, *Fluoric*, *Phoſphoric*, *Oxalic*, *Tartareous*, *Arſenic*, *Succinic*, *Citric*, *Formic*, *Lactic*, *Benzoic*, *Acetic*, *Saccho-lactic*, *Boracic*, *Sulphureous*, *Nitrous*, *Carbonic*, *and Pruſſic*, *Water*, *Unctuous Oils*, *Sulphur*, *Metallic Oxyds*; in the dry way, *Phoſphoric Acid*, *Boracic*, *Arſenic*, *Sulphuric*, *Nitric*, *Muriatic*, *Sebacic*, *Fluoric*, *Succinic*, *Formic*, *Lactic*, *Benzoic*, and *Acetic*, *Baryt*, *Lime*, *Magneſia*, *Alumine*, *Silex*, *Sulphur*.

In ſolution ſometimes preſcribed internally; in the concrete form frequently employed as a *Cauſtic*.

## *Of Mineral Alkali. (Soda.)*

Found in great abundance in the mineral kingdom, particularly in combination with *Muriatic Acid*.—Obtained in a ſeparate form, from *Carbonate* of *Soda*, by means of *Lime*, as in the caſe of *Potaſh*, from *Carbonate of Potaſh*.

Its

Its form, colour, taſte, cauſticity, &c. nearly the ſame with thoſe of the former alkali.

Acts alſo powerfully on the *Earths* and *metallic Oxyds*, and unites readily with *unctuous Subſtances.* forming harder soaps than if mixed with vegetable alk

Its more important ſaline compounds are,

1ſt. *Sulphate* of *Soda* (*Natron Vitriolatum* P. L.), obtained by ſolution and cryſtalliſation from the matter left behind in the preparation of *Muriatic Acid*, *Muriate of Ammoniac*, or *Muriate of Quick-ſilver*. Form of its cryſtals, *priſmatic.*—Taſte, *bitter.*—Effloreſces on expoſure to *Air.*—Readily ſoluble in *Water.*—When expoſed to *Heat* undergoes watery fuſion. May be decompoſed in the ſame way as *Sulphate* of *Potaſh.*—Uſed only as a *Cathartic.*

2d. *Muriate of Soda* (*Common Salt*) obtained by evaporation from *Sea Water*, or the water of *ſaline Springs*, or the ſolution of *Rock Salt*, which is found in great abundance.—Form of its cryſtals *cubical.*—Taſte, agreeably *ſaline.*—Equally ſoluble in hot as in cold *Water.* Soluble alſo in *Spirit.*—Decrepitates on ſudden expoſure to *Heat.* Melts in a red heat without decompoſition. By

Soap when well made of the Mineral Alkali is entirely soluble in Spirits of Wine, and all Soaps are soluble in the acids.— When the Soap is decomposed by water, and becomes greasy, it may be remedied by adding a small quantity of either the Carbonate of Potash or Soda—

1st At Apothecaries Hall the Natron Vitriolatum is prepared with the common Salt and the Sulphuric Acid, but there is no neceſsity for preparing it in such a costly way—

3 The bay salt is prepared by the evapouration of Sea water it is the purest and most expensive. Its colour depends upon its mixture with heterogeneous matter—

The Rock Salt is not used untill it is diſsolved and evapourated, altho' pure before—

The effects of this Salt depends upon the quantity used, large quantities are found to be antiseptic but small and divided quantities are Septic—

If Muriat of Soda is mixed with powdered Lytharge, it will be decomposed, and the product be Oxy Muriat of Lead, and Carbonate of Soda, the Oxy Muriat of Lead makes a valuable yellow, called Turners Patent yellow—

The Saltneſs of the Sea Water depends upon its containing a quantity of this Salt, but this is in greater or leſs proportion in different parts of the Sea, in the Baltic the proportion is 1/64th Between England and Flanders 32nd and near Spain 16th—

# Of the Mineral Alkali

* 100 Parts of which consist of 52 Muriatic Acid, 42 Soda, and 6 Water. —

4th It is improperly called Tartrite of Soda, as it contains the Vegetable as well as the Mineral alkali —— and therefore to be called Tartrite of Soda and Potash. —

being intenſely heated may be converted into vapour.—Promotes the fuſion of many of the *earthy* and *metallic* bodies.—May be decompoſed in the moiſt way by *Sulphuric* and *Nitric Acids*; and in the dry way, by the *Phoſphoric*, *Boracic*, and *Arſenic*.—May alſo be decompoſed by *Oxyd* of *Lead*; hence the preparation of Turner's *Patent Yellow*.*—Of extenſive application in *Agriculture*, *Glaſs-making*, *Glazing*, *Metallurgy*, *Soap-making*, *Diet*, *Medicine*, &c.

3d. *Phoſphate of Soda* (*Soda Phoſphorata* P. Edin.) Obtained by uniting *Phoſphoric Acid* and *Soda* to the point of ſaturation, evaporating, and cooling. Form *cryſtalline*.—Taſte not unpleaſantly *ſaline*.—*Efloreſcent*.—Diſſolves readily in *Water*.—Forms a triple ſalt with *Ammoniac*, (*Sal Microcoſmicus*).—Lately introduced as a *cathartic*. and Dyeing.

4th. *Tartrite of Soda* (*Natron Tartariſatum* P. L.) Obtained, by evaporation and cryſtalliſation, from the union of *Soda* with *Tartareous Acid*, by adding to a ſolution of the former *Acidulous Tartrite of Potaſh*.—Form of its cryſtals, *priſmatic*.—Taſte *bitteriſh ſaline*.—In moſt of its properties, and in its application, analogous to the *Tartrite of Potaſh*.

5th. *Borate of Soda*, (*Natron Boracicatum* P. L.) Obtained in an impure form from the ſpontaneous evaporation of the water of certain lakes in the kingdom of *Thibet*; ſaid alſo to be found in *South America.*—Purified by ſubſequent ſolution, boiling, and cryſtalliſation —Form of its cryſtals, *priſmatic.*—Taſte *ſtyptic.*—Readily ſoluble in *hot Water.*—Changes vegetable blue colours to green.—When heated, parts with its water of cryſtalliſation, and melts into a tranſparent *Glaſs*, which effloreſces on expoſure, and may be again diſſolved in water.—Serves as a flux for all the *Earths* and moſt of the *Metallic Oxyds.*—May be decompoſed in the moiſt way, by the *Sulphuric*, and ſeveral other acids; in the dry way, by the *Phoſphoric* only.—Employed chiefly in *Metallurgy*, and *Glaſs-making.* and Medicine

6th. *Carbonate of Soda*, (*Natron Præparatum* P. L.) Found native in the iſland of *Teneriffe*, *Egypt*, and elſewhere. Obtained alſo from the aſhes of certain marine plants, by elixation, evaporation, and cryſtalliſation. —Form of its cryſtals, *octohedral.*—Effloreſces on expoſure to *Air.*—Its other properties and uſes nearly ſimilar to thoſe of *Carbonate of Potaſh.* Employed in Medicine

Order

## Of the mineral Alkali

# Of the Volatile Alkali

If you take powder of zinc, and mixing with it Nitric acid, after which adding lime to the Mixture, the Volatile alkali will be given out.—

This shows it to be a compounded substance, and made up of certain Elements.—

It is frequently called Animal alkali, being obtained from muriate of Ammoniac.—

This gas is incapable of supporting Animal life, but when mixed with atmospherical air, it appears to increase combustion but then [illegible] it immediately extinguishes it. But it must be remembered before this takes place the flame is increased, being of a light yellow colour.—

Order of Attraction, alſo, of this Alkali, the ſame as that of *Potaſh.* But inf: more in Degree.

## *Of Volatile Alkali (Ammoniac).*

Obtained from the decompoſition of *Muriate of Ammoniac,* by *Potaſh, Soda,* or *Lime.* more [illegible].

Form *gaſeous.*—Smell extremely *pungent.*—*Cauſtic.* — *Azotic.* — Lighter than *Atmoſpherical Air.*

Is abſorbed both by *Water* and *Spirit*; by the former with great rapidity, producing an increaſe of temperature and bulk (*Aqua Ammoniæ Puræ* P. L.). *Ice* diſſolved in this fluid, on the contrary, produces cold.

Is in a ſlight degree *inflammable.*

May be decompoſed in various ways; as by expoſure to *Heat,* by the *Electric Spark,* in the reduction of *Metallic Oxyds,* by the diſtillation of *Nitrate* of *Ammoniac,* &c. yielding in ſome caſes *Hydrogen,* in others *Azotic Gas,* which gaſſes by particular modes of combination have been found to reproduce it, and are therefore conſidered as its elements.

The

The principal ſaline compounds of this *Alkali* are,

1ſt. *Sulphate of Ammoniac.* Obtained by the union of *Sulphuric Acid* with *Ammoniac,* on the addition of diluted *Sulphuric Acid* to liquid *Carbonate of Ammoniac.*—Form, *cryſtalline.*—Taſte, *bitter, pungent.*—Eaſily ſoluble in *Water.*—*Fuſible. Volatile.*—Employed principally in the manufacture of *Muriate* of *Ammoniac.*

2d. *Nitrate of Ammoniac.* Obtained by ſlow evaporation, from the combination of *Nitric Acid,* and *Ammoniac.*—Form, *cryſtalline.*—Taſte *cool, bitter, urinous.*—*Deliqueſcent.*—Eaſily *fuſible.* Under cautious diſtillation, yields *Nitrous Gas, Oxygen Gas,* and *Water*; but detonates when ſuddenly heated.

3d. *Muriate of Ammoniac,* (*Sal Ammoniacus* P. L.) Found native in the neighbourhood of *Volcanos*; prepared alſo, in large quantities, in the dry way, by compounded chemical affinity, from a mixture of *Sulphate of Ammoniac* and *Muriate of Soda.*—Form *concrete.*—Taſte *penetrating, acrid, urinous.*—Readily ſoluble in *Water,* producing cold; ſoluble alſo in *Spirit.* Cryſtalliſes under evaporation into ſmall quadrangular *Priſms.*

# Of the Volatile Alkali

2nd By cautious distillation the Gaseous Oxyd of Azote is produced, and by an increase of Oxygen, Nitrous Gas, by a further increase Nitrous acid, and by the greatest poſsible quantity of Oxygen, the Nitric acid is produced. —

5th Carbonate of Ammoniac differs from Sal vol: C: C: in no other respect than in being more pure, the salt of hartshorn being contaminated generally with empyreumatic Oil ———

*Priſms.*—Of extenſive application in *Dying*, *Tinning*, *Soldering*, &c. uſed alſo frequently in *Medicine.* internally Diuretic, Externally Stimulant.

4th. *Acetite of Ammoniac* (*Aqua Ammoniæ Acetatæ* P. L.) Prepared by ſaturating *Acetous Acid* with *Ammoniac.* — Form, *liquid.* — Taſte *urinous.*—Employed as a *diaphoretic*; ſometimes alſo uſed externally as a *diſcutient.*

5th. *Carbonate of Ammoniac* (*Ammonia præparata* P. L.) Obtained by diſtillation from moſt animal, and ſome vegetable and mineral ſubſtances; or from the decompoſition of *Muriate of Ammoniac*, by *Carbonate* of *Potaſh* or of *Lime.* Form *concrete.* — Smell, *pungent.* — Taſte, *urinous.* — Very ſoluble in *Water* (*Aqua Ammoniæ* P. L.) Soluble alſo in *Spirit* (*Spiritus Ammoniæ* P. L.) With unctuous ſubſtances forms an imperfect *Soap* (*Linimentum Ammoniæ* P. L.) Like all the foregoing compounds may be decompoſed by *Potaſh*, *Soda*, *Baryt*, or *Lime.*

Agrees nearly with the other *Alkalis*, in the order of its Attraction, both in the humid and dry way. But inferior in Degree to both the fixed Alkalis.

# OF EARTHS.

^ Seldom or never free from foreign admixture; when purified artificially they are

^ Diſtinguiſhed by their *Brittleneſs*, *Fixity*, ſparing ſolubility in *Water*, *Inſipidity*, want of *Odour*, incapacity of communicating a tinge to *Glaſs*, and their ſpecific gravity not exceeding that of *Water* more than in the proportion of 5 to 1.

Theſe characters poſſeſſed more perfectly by ſome of the earths than by others; hence the diſtinction into *Saline* and *Inſipid*.

All the earths ſoluble in one or other of the *Acids*, and ſome in all.

Cannot be precipitated from their ſolutions by *Pruſſiate of Potaſh* or of *Lime*, as is the caſe with all metals, *Platina* excepted.

The earths at preſent known are *Baryt*, *Strontian*, *Lime*, *Magneſia*, *Alumine*, *Silex*, *Adamantine Earth*, *Jargon Earth*, and *Sidnean Earth*. in very small quan

## *Of Baryt.*

Found in combination, 1ſt. with Carbonic Acid, (*Carbonate* of *Baryt*); 2d. with Sulphuric Acid, (*Sulphate* of *Baryt*, *Baroſelenite*); or 3d. with Sulphuric

## Of Earths

If you take any Earth, you may tell whether it contains any metallic oxyd by fusing it with Borax, as in that process, providing there be any contained in it, you will know by the particular tinge given to the Borax——

Silex is the least capable of being acted upon by any of the acids, and indeed it is only acted upon by the Acid of fluor which dissolves it——

Tho the Earths seperately are incapable of being acted upon by the most intence degree of heat, yet when two are in union, then they become fusible ——

We find the most considerable part of the Globe composed of the Calcareous, alumine, and Silicious Earths, and to these might be added magnesia, and it is this Earth that gives that unciosity to the different Mineral substances And these three Earths are of the greatest importance to the artists, for Silicious Earth is the Basis of ~~Pottery~~ Glass, the Calcareous Earth of the different Cements, and the alumine of the different kinds of Pottery, From the solubility of Strontian, Lime, and Magnesia, Fourcroy has classed ~~them~~ with the Alkalies, but if all their properties are considered they will be found to be more properly Earths.—

## Of Baryt.

Carbonate of Baryt is found native in Lancashire ——

This has been placed among the alkalies, and is not very soluble in water, it is the heaviest of all the Earth.—

It is found in combination with Carbonic and Sulphuric acid, both these are found native in this Country.—

Sulphuric Acid, Silex, Sulphate of Alumine, Sulphate of Lime, and Petroleum, (*Liver Stone.*)

Obtained in a ſeparate ſtate, by the application of a ſtrong heat, from *Carbonate* of *Baryt* prepared artificially.

Form *pulverulent.* Colour *white.* Specific gravity 4.000.

Soluble in about 900 times its weight of water, communicating to it properties analogous to thoſe of *Lime-water.*

Infuſible.

Unites with the *Sulphuric Acid* into a compound requiring for its ſolution 40,000 times its weight of *Water*. With the *Nitric* and *Muriatic Acid* forms cryſtalliſable ſalts.

Melts with effervefcence when mixed with *Borax* or *Microcoſmic Salt.*

Unites with *Sulphur* into a ſpecies of Hepar, (*Sulphuret* of *Baryt*).

Order of Attraction in the moiſt way, *Sulphuric Acid*, *Oxalic*, *Succinic*, *Fluoric*, *Phoſphoric*, *Saccho-lactic*, *Nitric*, *Muriatic*, *Sebacic*, *Citric*, *Tartareous*, *Arſenic*, *Formic*, *Lactic*, *Benzoic*, *Acetic*, *Bo-*

*racic*, *Sulphureous*, *Nitrous*, *Carbonic*, and *Pruſſic*, *Water*, *Unctuous Oils*, *Sulphur*; in the dry way *Phoſphoric*, *Boracic*, *Arſenic*, *Sulphuric*, *Succinic*, *Fluoric*, *Nitric*, *Muriatic*, *Sebacic*, *Formic*, *Lactic*, *Benzoic*, and *Acetic Acids*, *Potaſh*, *Sulphur*, *Oxyd of Lead.*

The ſoluble forms of this earth remarkable, for their violent effects, when exhibited internally.

Uſed principally as a teſt for aſcertaining the preſence of *Sulphuric Acid.*

## *Of Strontian.*

Found in combination with Carbonic Acid, *Strontheanite*; the expoſure of which to heat furniſhes the pure earth.

Moſt of the properties of this intermediate between thoſe of *Baryt* and *Lime.*

More ſoluble however than either, and remarkable for the property of cryſtalliſing into *tranſparent rhomboidal priſms.* which are very beautiful

Attraction, the ſame as that of *Baryt*, as to order, but inferior to it in degree.

Of Baryt

## Of Strontian

Strontian is found in Combination with Carbonic Acid. in Strontean in Scotland ——
This Earth is also placed by some among the Alkalies. —
The solution of this Earth in Spr of Wine burns with a Red flame, which is characterizing of Strontian —

# Of Lime

There is no difference between Marble and lime Stone, excepting that of Texture. They are a compoun of Calcarious Earth and Carbonic Acid, and the variety of colour in Marble depends entirely upon the degree of Oxydation of the metal with which it is combined ———

# *Of Lime.*

Found 1ſt. uncombined, *Native Quicklime*; 2d. in union with Carbonic Acid and Water, *Calcareous Spar, Marble, Lime-Stone, Chalk*, &c. 3d. with Carbonic Acid and Petroleum, *Swine-Stone*; 4th. with Carbonic Acid and Oxyd of Manganeſe, *Sidero-Calcite*; 5th. with Carbonic Acid and Carbonate of Baryt, *Baryto-calcite*; 6th. with Carbonic Acid, Carbonate of Magneſia, Iron, and Manganeſe, *Muri-Calcite*; 7th. with Carbonic Acid, Magneſia, Alumine, and Iron, *Schiefer Spar*; 8th. with exceſs of Carbonic Acid, Alumine, Magneſia, and Iron, *Dolomite*; 9th. with Fluoric Acid and Water, *Fluor*; 10th. with Phoſphoric Acid, *Apatite*; and 11th. with Sulphuric Acid and Water, *Gypſum, Selenite, Plaſter of Paris.*

Prepared for various purpoſes from *Carbonate of Lime*, by the continued application of a ſtrong heat.

Form *concrete* or *powdery*. Taſte *hot, pungent, cauſtic*. Specific gravity 2.3.

Soluble in about 700 times its weight of water (*Aqua*

(*Aqua Calcis* P. L.) Changes vegetable blue colours to green.

On being ſuddenly moiſtened, emits both *Heat* and *Light*, loſing at the ſame time its attraction of coheſion. The ſame takes place ſpontaneouſly on expoſure to *Air*. On further expoſure attracts Carbonic Acid from the Atmoſphere; hence the increaſe of hardneſs obſervable in *calcareous Cements*.

Though infuſible *per ſe*, promotes very powerfully the fuſion of all the other earthy Bodies.

Melts with *Borax* and *Microcoſmic Salt*, without efferveſcence. Melts alſo with *Oxyd of Lead*.

Forms, with the *Sulphuric Acid*, a compound of little ſolubility in water, *Gypſum*; with the *Nitric* and *Muriatic*, ſalts ſtrongly deliqueſcent.

With *Sulphur*, a calcareous Hepar; with unctuous ſubſtances, peculiar *Soaps*.

Suppoſed in many inſtances to be of animal origin. evidently so in many places

Order of attraction in the moiſt way, *Oxalic Acid*, *Sulphuric*, *Tartareous*, *Succinic*, *Phoſphoric*,

*Saccho-*

## Of Lime

The many Islands in the Pacific Ocean are without doubt of animal origen ——

The greater part of the Earth is made up of Calcarious Earth; but to say the whole of it was of Animal origen would be going too ar ——

# Of Lime

# Of Magnesia

Magnesia gives a smoothness and unctuosity to Earths it is in combination with, it is not peculiar to this, for Clay has a greasy feel but more harsh and may be known from it by breathing upon it, for it gives out a particular smell, it could not be known from soap by the feel —

If you heat Fullers Earth and pour boiling water upon it, it will fall down like lime, but gives out neither heat nor light —

You may distinguish a mixture of Magnesia from Lime by pouring upon it the diluted Sulphuric acid, the Magnesia will be held in solution and the Lime will fall to the bottom

This is also known from Lime by not being of so caustic a nature than lime. —

*Saccho-lactic*, *Nitric*, *Muriatic*, *Sebacic*, *Fluoric*, *Arſenic*, *Formic*, *Lactic*, *Citric*, *Benzoic*, *Acetic*, *Boracic*, *Sulphureous*, *Nitrous*, *Carbonic*, and *Pruſſic*, *Water*, *Unctuous Oils*, *Sulphur*; in the dry way, *Phoſphoric*, *Boracic*, *Arſenic*, *Sulphuric*, *Succinic*, *Nitric*, *Muriatic*, *Sebacic*, *Fluoric*, *Formic*, *Lactic*, *Benzoic*, and *Acetic Acids*, *Potaſh*, *Sulphur*, *Oxyd of Lead*.

Uſed extenſively as the baſis of *Calcareous Cements*, *Plaſter* and *Stucco*; in *Dying*, *Bleaching*, *Tanning*, *Sugar-baking*, and various other arts, beſides its application in *Medicine*.

## *Of Magneſia.*

Found 1ſt. in union with Lime and ſome Iron, *Calci-murite*; 2d. with Silex, Alumine, Lime, Oxyd of Iron, and Water, *Argillo-murite*; 3d. with Carbonic Acid, Silex and Iron, *Silici-murite*; 4th. with Silex and Alumine, *Talc*; 5th. with Silex, Alumine, Iron, and Carbonate of Lime, *Lapis Ollaris*; 6th. with Silex, Alumine, Iron, Air and Water, *Steatites*; 7th. with Silex, Iron, Carbonate of Lime, Alumine, Muriate of Magneſia, and Water, *Serpentine*; 8th. with Silex, Alumine,

mine, Lime, Iron, Air, and Water, *Chlorite*; 9th. with Carbonic Acid, Silex, Carbonate of Lime, Alumine, and Oxyd of Iron, in different proportions, *Aſbeſtos*, *Amianthus*, *Suber montanum*, *Actynolite* and *Jade*; 10th. with Silex, Lime, and Oxyd of Iron, *Baikalite*; 11th. with the Boracic Acid, Lime, Silex, Alumine, and Iron *Boracite*; and 12th with Sulphuric Acid, *Sulphate of Magneſia*.

Prepared from a ſolution of this laſt, by the addition of *Carbonate of Potaſh*, and ſubſequent expoſure of the waſhed earthy precipitate to a ſtrong and continued heat.

Form *pulverulent*. Colour *pure white*. Taſte *inſipid*. Specific gravity about 2.3.

Requires for its ſolution 7900 times its weight of water.

Infuſible without addition, even in the moſt intenſe degrees of Heat; but melts into a glaſs with *Lime*, *Microcoſmic ſalt*, or *Borax*.

Unites with all the Acids. With the *Sulphuric Acid* regenerates *Sulphate of Magneſia* (*Magneſia Vitriolata* P. L.) With *Carbonic Acid*, Carbonate of Magneſia (*Magneſia Alba* P. L.)

Is a principal ingredient in the preparation of the finer kinds of *Porcelain*.

# Of magnesia

Sulphate of magnesia is to be diſsolved in 7 times its weight of water and to this solution add the the Carbonate of Potash, you then boil it and wash it untill the acid is driven off, and when dried it will be pure magnesia. —

## Of Magnesia

## Of Alumine

Alumine is a substance which gives a degree of Plaisticity when mixed with water, that which is called common clay contains a very large proportion of Silex

May be combined, in ſmall proportions, with *Sulphur.*

Order of Attraction in the moiſt way, *Oxalic Acid, Phoſphoric, Sulphuric, Fluoric, Sebacic, Arſenic, Saccho-lactic, Succinic, Nitric, Muriatic, Tartareous, Citric, Formic, Lactic, Benzoic, Acetic, Boracic, Sulphureous, Nitrous, Carbonic,* and *Pruſſic, Sulphur*; in the dry way, *Phoſphoric, Boracic, Arſenic, Sulphuric, Fluoric, Sebacic, Succinic, Nitric, Muriatic, Formic, Lactic, Benzoic,* and *Acetic Acids, Potaſh, Sulphur, Oxyd of Lead.*

In common uſe in diſorders of the *Primæ Viæ* as an *ancacid* and *laxative.*

## *Of Alumine.*

Found united to, 1ſt. Carbonic Acid and Lime, *Lac Lunæ*; 2d. to Silex, *Clay*; 3d. to Silex, Carbonate of Lime, Carbonate of Magneſia, Oxyd of Iron, Air and Water, in different proportions, *Lithomarga, Fuller's Earth* and *Bole*; 4th. to Silex and Iron, *Tripoli*; 5th. to Silex, Oxyd of Iron, Manganeſe, Water and Air, *Lipidolite*; 6th. to Silex, Magneſia, Iron and Lime, in different proportions, *Sapari, Hornblende,* and

*Baſalt*;

*Baſalt*; 7th. to Silex, Magneſia, and Oxyd of Iron, *Mica*; without Magneſia, *Micarelle*; 8th. to Silex, Iron, and Carbonate of Lime, *Calp*; 9th. to Silex, Magneſia, Iron, and Petroleum, *Argillaceous Schiſtus*; and 10th. to Sulphuric Acid, *Sulphate of Alumine.*

Obtained in its pureſt form from a ſolution of *Sulphate of Aluminè* (common alum), by the addition of *Potaſh*, *Soda*, or *Ammoniac.*

Form *powdery*. Colour, when dry, *pure white*. Feel *unctuous*. Taſte *inſipid*. Specific gravity 2.

Inſoluble in *Water*. When moiſtened becomes plaſtic. Hardens and contracts, when expoſed to the higher degrees of *Heat*; but very difficult of fuſion, therefore the baſis of the different kinds of *Pottery*.

Fuſible, with effervefcence, both with *Microcoſmic Salt* and *Borax*.

Combines with moſt *Acids*, but with great difficulty, except under precipitation. The moſt important of theſe compounds, the *Sulphate of Alumine*; prepared from the decompoſition of *Argillaceous Schiſtus*. Form of its cryſtals *octohedral.*

# Of Alumine

To obtain the purest alumine. add an Alkali to a solution of common alum, then dissolve the precipitate which forms in muriatic acid and then precipitate it again with ~~Carbonate~~ Ammoniac, which precipitate will be pure. after frequent washing &c. —

The goodness of Porcelaine depends upon its fusibility —

All calcareous or saline matter should be avoided in the making of Bricks, for when mixed with these they soon perish. The Windsor Bricks contain a little mica in them. —

Most of the precious Stones contain more argille in them than Silex, for the Experiments which were formerly made on them are found to be erroneous. —

## Of Alumine

## Of Silex

There are some Springs which contain a large quantity of Silicious Earth, and in case any perishable substance is put into it, in proceſs of time it will take to it the Silicious Earth, whereby it becomes as it is said petrified — The Granite found in the primitive Mountains principally consists of Quartz. Mica and Feltspar —

*hedral.* Taſte *aſtringent.* Soluble in about 14 times its weight of *Water.* Undergoes watery fuſion, and parts with its water of cryſtalliſation, on expoſure to *Heat* (*Alumen Uſtum* P. L.) When calcined with certain inflammable ſubſtances, as yolk of egg, or ſugar, produces a compound, which takes fire ſpontaneouſly on expoſure to *Air* (*Pyrophorus* of *Homberg*).

Order of Attraction of *Alumine* in the moiſt way, *Sulphuric Acid, Nitric, Muriatic, Oxalic, Arſenic, Fluoric, Sebacic, Tartareous, Succinic, Saccho-lactic, Citric, Phoſphoric, Formic, Lactic, Benzoic, Acetic, Boracic, Sulphureous, Nitrous, Carbonic,* and *Pruſſic*; in the dry way, *Phoſphoric, Boracic, Arſenic, Sulphuric, Nitric, Muriatic, Fluoric, Sebacic, Succinic, Formic, Lactic, Benzoic,* and *Acetic Acids, Potaſh, Sulphur, Oxyd of Lead.*

Uſes, comprehending thoſe of Sulphate of Alumine, *Dying, Tanning, Printing, Silvering, Painting, Pottery, Medicine,* &c.

## *Of Silex.*

Found in union, 1ſt. with Alumine, Lime, and Iron, as in moſt of the *precious Stones, Hyalite* and *Prehnite*; 2d. with Alumine only, *Schorlite*, and *Calcedony*; 3d. with Alumine and Iron, *Olivin*, *Elaſtic Quartz*, *Obſidian*, *Opal*, *Pitch-ſtone*, *Hornſlate*, *Jaſper*, and *Argentine Felſpar*; 4th. with Alumine, Lime, Magneſia and Iron, *Schorl*, *Thumerſtein* and *Silicious Spar*; 5th. with Alumine, Iron and Mangane̔ſe, *Rubellite*; 6th. with Alumine and Lime, *Quartz*, *Flint*, *Hornſtone*, and *Ædelite*, and with water *Zeolite*; 7th. with Oxyd of Nickel, Lime, Alumine, and Oxyd of Iron, *Chryſopraſe*; 8th. with Lime, Magneſia, Iron and Coal, *Silicious Schiſtus*; 9th. with Alumine, Lime, Sulphate of Baryt, Magneſia, and Iron, *Adularia*, without Iron, *Felſpar*; 10th. with Alumine, Sulphate of Lime, and Oxyds of Copper and Iron, *Labrador-Felſpar*; 11th. with Alumine, Baryt and Water, *Staurolite*; and 12th. with Lime, Sulphate of Lime and Iron, *Lapis Lazuli*.

May be ſeparated from moſt of theſe by digeſtion in *Nitric Acid*.

Colour *white*. *Inſipid*. *Inſoluble*. Specific gravity 2.66. *Infuſible*.

Soluble in the *Fluoric*, but in no other acid.

Soluble alſo in the ſolution of either of the *fixed Alkalis*.

May

# Of Silex

The colour of the Silicious Earths depends upon its being mixed with the different metals.—

The different Sands and Flints are most composed of Silex.—

There are doubts whether Silex will chemically combine with water, as some have supposed it to do in certain Springs.—

The best Acromatic glaſses are made by a double convex of Crown Glaſs, and behind this a double concave leſs of Flint glaſs.—

## Of Silex

Silex is the basis of Glaſs, it is composed of Silex, viz: Fixed Alkali, Oxyd of Lead, and Oxyd of Mangalese. in the making of common glaſs they are used in any quantity and impure, but in the making of glaſs which you wish to have of the greatest transparency the ingrediants must be had in the purest form, the colour is given by the addition of some of the Oxyds, and it is of consequence in the examination of metals, for you may know by the colour given to glaſs what metal the Oxyd contains

## Of Adamantine Earth

Its properties not yet known and some think it is not a particular Earth ——

May be fuſed with *Lime*, *Microcoſmic Salt*, or *Borax*; but much more readily with *Potaſh* or *Soda*: hence the preparation of the different kinds of glaſs.

When melted with a large proportion of *Alkali*, forms a deliqueſcent compound, *Liquor Silicum*, the decompoſition of which by an *Acid*, furniſhes a gelatinous precipitate thought to be ſoluble in about 1000 parts of *Water*.

Order of Attraction in the moiſt way, *Fluoric Acid*, *Potaſh*; in the dry way, *Potaſh*, *Boracic Acid*, *Phoſphoric Acid*, *Oxyd of Lead*.

Uſed principally in *Poliſhing*, *Painting*, *Glaſs-making*.

## Of Adamantine Earth.

Found combined with Silex, Iron and Nickel, in *Adamantine Spar*, of which it conſtitutes above $\frac{2}{3}$ of the whole.

Inſoluble in *Acids*.

Infuſible with *Alkalis*.

The other properties of this Earth not as yet fully aſcertained.

## *Of Jargon Earth.*

Combined with Silex, Iron, and Nickel, in the Stone called *Jargon* or *Circon.*

Colour, *white.* Specific gravity eſtimated at 4.000.

With *Sulphuric Acid* forms an aſtringent ſalt with ſtelliform cryſtals; with the *Acetous Acid*, a ſalt incapable of cryſtalliſation.

Inſoluble even in a boiling ſolution of *Potaſh.*

Melts with *Borax* without efferveſcence; but infuſible with either the *Fixed Alkalis*, or *Microcoſmic Salt.*

Order of Attraction as yet unknown.

## *Of Sidneyan Earth.*

Found in a mineral, from *Sidney Cove*, conſiſting of white ſand, colourleſs Mica, a few black particles, and white Alumine, with which this Earth appears to be mixed, and from which it may be extracted by the *Muriatic Acid.*

Of Jargon Earth

Of Sidneyan Earth

## Of Sidneyan Earth

## Of Metals

The Splendour of metals differs from that in any other bodies, and their splendour seems to depend upon their Opacity, and this opacity is such that the plate which is the 250,000th part of an inch in thickness is Opake, and will not transmit a Ray of Light. —

The quickness with which they transmit the Electric fluid is such that it will pass through a wire two or three miles in length so quick that the Senses cannot take cognizance of it. —

The easier metals decompose water the more sensible their taste is on applying them to the Tongue. —

It is of consequence to know when Sulphur is in union with a metal, whether it is united to the metal in its metallic state as in its oxydated state for the difference is one contains more Oxygen than the other. This is seen in Quicksilver when in union with it as a metal you have a black powder Ethi: min: and then with the oxyd a beautiful [illegible]

Colour, *white*. Fuſible at 150 of *Wedgwood's Thermometer*.

Not ſoluble either by the *Sulphuric* or *Nitric Acid*.

Precipitable from its ſolution in the *Muriatic Acid*, by *Alkalis*, or by the affuſion of *Water*. Its combination with this Acid may alſo be decompoſed, by the addition of the *Sulphuric*.

Order of Attraction not further aſcertained.

# OF METALS.

Diſtinguiſhed by their *Weight*, *Opacity*, and *Splendour*. Alſo remarkable for their power of conducting the *Electrical Fluid*. to the different colours their oxydes give, to glass

Preſented to us by nature under different forms, as, 1ſt. *Native*, i. e. when in poſſeſſion of the properties juſt mentioned; 2d. *Oxydated*, or in union with *Oxygen*; 3d. *Saline*, or united with one or other of the *Acids*; 4th. *Mineralized*, or combined with *Sulphur*; and Arsenic and 5th. *Alloyed*, or in union with each other.

Different proceſſes therefore neceſſary for obtaining theſe bodies in a ſeparate ſtate; hence the *Pounding*, *Waſhing*, *Roaſting*, *Amalgamation*, and *Reduction* of Metallic ores.

May be conſidered inſoluble in *Water* at a common temperature, though capable of decompoſing it, under certain circumſtances.

Differently affected by expoſure to *Air*.

*Fuſible* and *Volatile* at very different temperatures. All *cryſtalliſe* in cooling. The oxyds of many *vitrifiable*.

Some *Malleable* and *Ductile*, others *Fragile*; hence the diſtinction into *Metals* and *Semi-Metals*.

Some capable, others incapable of *Oxydation* under the joint action of *Heat* and *Air*; hence again the diviſion into *perfect* and *imperfect*.

All metals combinable with one or other of the *Acids*, with which they produce for the moſt part cryſtalliſable ſaline compounds. May be in ſome inſtances converted, by the decompoſition of the acid, into the ſtate of *Oxyd*, in others completely *acidified*.

## Of Metals

Roasting is only applicable where the mettalic Ore is in combination either with Sulpher or Arsenic or with both, it is then said to be mineralized, and Roasting is made use of to dissipate these Volatile substances, by which means the mettallic Ore is left in a state of Oxyd. you may always know which it contains, by the peculiar smell —

Amalgamation is understood when Quicksilver is brought into Chemical Union with any of the metals —

Tin is the most fusible of any of the metals, Platina the least so. The Oxyds of Lead and Bismuth greatly facilitate the Vitrification of the other mettallic bodies —

The process of reduction is required when in a state of Oxyd, in this you have nothing to do but to mix the Oxyd with a quantity of black flux, and expose it to the necessary degree of heat, but the 3 following metals are educed, the reason why Platina Gold and Silver are called perfect Metals, is in consequence of the Oxyds of these being brought back to their mettallic form without the addition of any substances except those of heat and light. This is right. —

There are some metals which when mixed become more fusible than any of the metals when in a separate state, hence the composition of different substances for Soldering. —

Before any metal can act upon an Acid it must be in a state of Oxyd, and they must either be in a state of Oxyd at the time, or the Acid must be such as to oxydate them before they can be dissolved, and the differance is that if you take the metal in a state of metal there will be an evolution of Gas, but when in a state of Oxyd no evolution takes place. —

## Of Metals

The gas that is evolved when a metal is put into an acid differs according to the substances you employ, it being sometimes nitrous gas, at others Hydrogen gas, and sometimes Ammoniacal gas, but rarely the latter, when it is the latter it arises from the Hydrogen of the water coming into union with the Azote of the nitric acid. —

We can regulate the degree of oxydation the same as we can that of any solution, so as to bring it to the point of saturation, hence the perfect and imperfect oxyds, for Example you may take Quicksilver, and say you have 100 parts of Quicksilver and 20 of oxygen, or 50 100 500 &c of Oxygen, this is of great consequence to remember for the metals differ much in their strength according to the degree and quantity of oxygen they have received, and sometimes you render an Oxyd harmless by adding a further addition of Oxygen in others you render them more active. —

The corrosion of a metal by an acid, is when the acid acts too powerfully on a metal, and bringing it into a state of an insoluble oxyd, and the way to dissolve it is by taking from it part of its oxygen. —

The solution of a metal may be decomposed, and the metal brought down in its metallic state by the addition of Charcoal, Phosphorus, and any of the essential oils. —

The attraction of Iron for charcoal is such, that when mixed with it you will have a metal differing in many respects from Iron, this is Steel, and by the application of heat and air you may dissipate the Charcoal (it forming Carbonic acid gas) and have the Iron in own natural state.

*In the mixture of Bismuth, Lead and Tin, you will have a compound which is softer than any known metal, & easier fusible. —

The *Metallic Oxyds*, generally ſpeaking, more readily ſoluble in *Acids*, than the *Metals* from which they are formed.

The ſame more remarkably the caſe with regard to *Alkalis*, which act on few of the metals unleſs they are previouſly *oxydated*.

The *Earths* do not appear to act on metallic ſubſtances, but unite, by fuſion, with their *Oxyds*.

*Metals*, when united with each other, often undergo remarkable changes of *Volatility*, *Fuſibility*, and *Specific Gravity*. All will unite in any proportion except Iron with Lead, or Iron with Zinc in silver.

By fuſion, moſt of them may be united to *Sulphur*. All except Platina. and they are generally found in combination with Sulphur.

All except *Zinc*, ſoluble in *Alkaline Sulphurets*.

The Attraction of the Metals for *Acids* in moſt inſtances inferior to that of the *Alkalis*, and *Earths*.

The perfect Metals are, *Platina*, *Gold*, and *Silver*:

## *Of Platina.*

Brought from *South America*, in ſmall grains of a dull ſilver-colour, mixed with ferruginous Sand, particles of Native Gold, and Quickſilver.

Both malleable and ductile when pure, though harder than either gold or ſilver.

Specific gravity upwards of 22.

Extremely difficult of fuſion, but when urged by an intenſe heat, becomes capable of being welded.

Diſſolves ſlowly in the *Oxy-muriatic Acid*, communicating to it firſt a yellow, and afterwards a deep reddiſh-brown colour. Inſoluble in the other acids, even with the aſſiſtance of heat.

Differs from all other metals in being precipitable from its ſolution by *Muriate of Ammoniac*; the precipitate, upon fuſion, yielding a malleable Regulus.

Said alſo to be ſoluble in *Sulphuret of Potaſh.*

Is ſcarcely affected in the dry way, either by *Compound Salts*, or by *Sulphur.*

# Of Platina

latina in many respects resembles Gold, first in its being omewhat heavier, also like it in not being soluble in ts metallic form by any of the Acids except, Aq. Regia, ve Aq. Muriatic Acid, and when dissolved in this acid they are mainly of a Colour, altho they so much differ in their metallic form. —

The only way by which you can distinguish Platina from Gold, accurately, is by the solution of Platina in Aqua Regia, being decomposed by Muriate of Ammonia while Gold is not, and in the solution of Gold being decomposed by Sulphate of Iron, while Platina is not. — Dr Babington thinks this metal will be used in time in the Business of Watergilding in the form of Amalgam as Gold is now used, which process will be seen under the head of Gold. ——

# Of Platina

## Of Gold

Gold crystallises in its metallic form in beautiful octahedral crystals.—

The best method of collecting gold when mixed with sand is by adding quicksilver to the mixture, when an amalgam of gold will be formed.—

Gold in whatever form it is found always contains a quantity of other matter, and when pure it consists of 24 parts called Carats, and the native gold contains about 22 Carats.—

Gold is decomposed from its solution in Aq. Regia by the Sulphate of Iron, while Platina is not and this is the distinction.—

Unites by fuſion in different proportions with many other metals, but moſt eaſily and intimately with *Zinc.* With *Copper* produces a compound of a golden colour, hard, malleable, cloſe grained, ſuſceptible of a fine poliſh, and durable.

Order of Attraction in the moiſt way, *Æther, Muriatic, Oxy-muriatic, Nitric, Sulphuric, Arſenic, Fluoric, Tartareous, Phoſphoric, Sebacic, Oxalic, Citric, Formic, Lactic, Acetic* and *Succinic Acids*; in the dry way, *Arſenic, Gold, Copper, Tin, Biſmuth, Zinc, Antimony, Nickel, Cobalt, Manganeſe, Iron, Lead, Silver, Quickſilver*, and *Sulphuret of Potaſh.*

Uſe as yet, principally, confined to Chemical and Philoſophical purpoſes.

## Of Gold.

Found either alloyed with Silver, Copper, or Iron, *Native Gold*; or combined with Sulphur, Antimony, Arſenic, Lead, Iron and Silver, *Grey Gold Ore*; or with Biſmuth and Sulphur, *White Gold Ore, Aurum Graphicum.*

When pure, of a bright yellow colour, ſoft, very tough, ductile and malleable to an extraordinary degree; not ſonorous.

Next to *Platina* the heavieſt body in nature, its *Specific Gravity* being 19.30.

Melts, after ignition, at 32 of *Wedgw.* = 5237 of *Farenh.* and may be volatilized by a more intenſe degree of heat. Cryſtalliſes in cooling, into quadrangular pyramids. Converted by electrical exploſions, into a purple *Oxyd.*

Soluble only in *Oxy-muriatic Acid,* the compound Acid, *Aqua Regia,* and in the ſolutions of *Alkaline Sulphurets.*

The *Oxy-muriatic* ſolution of a yellow colour, ſtains the ſkin purple.

Separable from this ſolution in a metallic form, by *Æthers, Eſſential Oils,* and *Phoſphorus,* by *Zinc* and many other metals; may be alſo precipitated by all the *Alkalis* and *Earths.* The precipitate by *Tin,* of a purple colour (*Purple Powder of Caſſius*), and communicates a red colour to glaſs; that by *Ammoniac,* has the property of exploding with great violence when expoſed to a moderate heat, *Aurum fulminans.*

Combines with all the *Metals* in various proportions.

## Of Gold

Gold is so exceeding malleable as to be beat into the 280,000th part of an Inch in thickness, and the Gold beaters take 15 Pennyweights of Gold and the smallest proportion of Copper, and they will furnish you with 2000 Leaves of 3 Inches and 3/8th square ——

## Of gold

The purifying of gold by lead is as follows, you add about 4 or 5 parts of silver to the gold, and then a quantity of lead in proportion to its impurity; you then expose these to the action of heat and air, in a muffel, in this way they will be brought into a state of fusion, the Lead quickly oxydates, and then vitrifies, when it takes from the gold and silver any impurities they contained, and the vessel being porous this vitrious mass is absorbed by the pores, and leaves the gold and silver in their purest state, the gold and silver being thus refined they are separated either by the addition of the oxymuriatic acid, or nitric acid, the latter is generally employed in its diluted state. If you only want to purify silver it may be done without the gold, but you must use the silver with the gold. —

Water gilding consists principally in making an amalgam of gold with quicksilver, the gold being [illegible], you first rub a little nitrate of quicksilver upon the metal, and then lay a thin surface of the amalgam upon this, you then add by the necessary degree of heat to seperate the silver from the gold, if you wish to have the surface a higher colour, add a little nitric acid to a solution of common salt and while the metal is hot plunge it into this mixture, after it is cool burnish it with steel. —

## Of Silver

portions. With *Silver* becomes paler; with *Copper* of a deeper colour, more fuſible, harder, and more elaſtic.

May be freed from admixture of imperfect metallic matter, by fuſion with *Lead*, together with acceſs of *Air*; hence the proceſs of *Cupellation.*

Order of attraction, in the moiſt way, *Æther*, *Muriatic Acid*, *Oxy-muriatic*, *Nitric*, *Sulphuric*, *Arſenic*, *Fluoric*, *Tartareous*, *Phoſphoric*, *Sebacic*, and *Pruſſic*, *Potaſh*, *Ammoniac*; in the dry way, *Quickſilver*, *Copper*, *Silver*, *Lead*, *Biſmuth*, *Tin*, *Antimony*, *Iron*, *Platina*, *Zinc*, *Nickel*, *Arſenic*, *Cobalt*, *Manganeſe*, *Sulphuret of Potaſh.*

Uſed in the conſtruction of *Utenſils* and different kinds of *Ornaments*; in *Enamelling*, *Gilding*, *Dying*, *Soldering*, &c.

## Of Silver.

Found, 1ſt. united to a ſmall quantity of gold, *Native Silver*; or 2d. to Arſenic and Iron, *Arſenical Silver*; or 3d. to Muriatic and Sulphuric Acids, Iron, Alumine and Lime, *Horn Silver*; or 4th. to Sulphur only, *Vitreous Silver*; or 5th. to Sulphur, Antimony and Iron, with a little Copper and Arſenic, *Brittle Vitreous Silver*; or 6th. to Arſenic and Sulphur; or to Antimony, Sulphur, and Sulphuric Acid, *Red Silver Ore*; or 7th. to Lead, Sulphur, Antimony, Iron, Alumine, and Silex, *White Silver Ore.*

Colour *white, ſplendid.* Leſs malleable and ductile than *Gold,* but harder and more opake.

*Specific gravity* 10.47.

Tarniſhes on expoſure to air.

Fuſible at 28 of *Wedgw.* = 4717 of *Farenh.* and by increaſe of heat may be volatilized, and partially *oxydated;* in which ſtate it communicates a yellow colour to *Glaſs.*

Moſt readily ſoluble in *Nitric Acid,* forming with it a corroſive cryſtalliſable ſalt, ſuſceptible of Watery Fuſion (*Argentrum Nitratum* P. L.) Soluble alſo in *Nitro-Sulphuric Acid, Aqua Regina* of *Keir.*

From the *Nitric Acid,* may be precipitated in the form of *Oxyd,* by *Alkalies* and *Earths,* or, unoxydated, by many of the *Metals,* and alſo by *Phoſphorus.* If thrown down by *Lime Water,* the *Oxyd* when dried, and afterwards waſhed with *Ammoniac,* explodes moſt violently on the ſlighteſt agitation, *Argentum fulminans.* You are never to use this but in the most minute quantities, and use great caution in making the preparation for the most trifling motion will explode it, even the motions of the air will explode it. —

Combines

Of Silver

The solution with the Nitric Acid is found of great use in the marking of Cloath, which in bleaching becomes extreamly black, for the more it is exposed to the Suns Rays the blacker it becomes—

It also changes the colour of the Skin and turns black, which never becomes of its original colour again.—

## Of Silver

## Of Quicksilver

The most pure Quicksilver is obtained by decomposing either native or artificial Cinnabar by Iron filings. these are to be put into an Iron retort when you are to proceed to distillation —

In order to separate Sulphur from Quicksilver, you have nothing to do but to add a metal to it which has stronger attraction for the Sulphur than the Quicksilver has, and therefore generally used. —

—

Combines extenſively with the other *Metals.* With *Copper* becomes harder and more ſonorous.

Combines readily with *Sulphur*, and is blackened by *Hepatic Gas.*

Order of Attraction, in the moiſt way, *Muriatic Acid*, *Sebacic*, *Oxalic*, *Sulphuric*, *Saccho-lactic*, *Phoſphoric*, *Nitric*, *Arſenic*, *Fluoric*, *Tartareous*, *Citric*, *Formic*, *Lactic*, *Acetous*, *Succinic*, *Pruſſic*, and *Carbonic*, *Ammoniac*; in the dry way, *Lead*, *Copper*, *Quickſilver*, *Biſmuth*, *Tin*, *Gold*, *Antimony*, *Iron*, *Manganeſe*, *Zinc*, *Arſenic*, *Nickel*, *Platina*, *Sulphuret of Potaſh*, *Sulphur.*

Uſed in the conſtruction of various *Utenſils*; compoſition of *Bell-metal*; in *Silvering*, *Enamelling*, *Soldering*, *Dying*, *Medicine*, &c.

The imperfect metals are *Quickſilver*, *Lead*, *Copper*, *Iron*, and *Tin.*

## *Of Quickſilver.*

Found 1ſt, *Native*; 2d. alloyed with ſilver, *Native Amalgam*; 3d. with Oxygen, *Native Oxyd*; 4th. with Muriatic and Sulphuric Acids, *Horn-*

*mercury*;

*mercury*; 5th. with Sulphur, *Cinnabar*; and 6th. with Sulphuret of Potaſh or Soda, *Hepatic Ore.*

Form *liquid.* Colour, *ſilvery-white.*

Specific Gravity 13.56.

Not perceptibly altered by expoſure. By agitation, with acceſs of air, is converted into a black *Oxyd:* a change analogous to this ſeems to take place on trituration with tenacious ſubſtances; hence *Pilulæ Hydrargyri*, *Unguentum Hydrargyri*, &c. P. L.

Volatile at 600° and congeals at 39 below 0 of *Farenh.* When heated with acceſs of air, is converted into a red *Oxyd* (*Hydrargyrus Calcinatus* P. L.)

Combines with, and partly decompoſes, concentrated *Sulphuric Acid*, by the aſſiſtance of heat, producing a ſaline maſs, which by the affuſion of water becomes of a yellow colour (*Hydrargyrus Vitriolatus* P. L.)

Very readily ſoluble in the *Nitric Acid*, with the production of *Nitrous Gas*; the ſolution evaporated produces alſo a ſaline maſs, which upon further decompoſition of the acid by expoſure to heat,

# Of Quicksilver

when diſsolved in the Nitric Acid and a quantity of ſp$^{r}$ Vin: Rect: add, and then dried, and if applyed to a certain degree of heat, a great explosion will take place this was discovered by M$^{r}$ Howard.—

You may obtain the mild muriat of Mercury in the dry way also, by mixing the Sulphate of Mercury to Muriate of Soda and adding Quicksilver and then apply the necessary quantity of heat, and you will have Calomel as pure as by the other process —

heat, is reduced to the ſtate of *Oxyd* (*Hydrargyrus nitratus ruber* P. L.)

Not acted upon by the *Muriatic Acid* unleſs through the medium of *Oxygen*, by the aſſiſtance of which it unites with it more powerfully than with either of the former acids; hence the preparation of Muriate of Mercury, by ſublimation, from a mixture of Sulphate of Mercury, and Muriate of Soda (*Hydrargyrus Muriatus* P. L.); of mild Muriate of Mercury in the dry way, by the addition of Quickſilver to the former, and repeating the ſublimation (*Calomelas* P. L.); and in the moiſt way, by the decompoſition of Nitrate of Quickſilver by Muriate of Soda (*Hydrargyrus Muriatus mitis* P. L.)

When oxydated, is diſſolved by the *Acetic Acid*, or may be united with it by adding *Acetite of Potaſh* to a ſolution of *Nitrate of Quickſilver* (*Hydrargyrus Acetatus* P. L.)

May be precipitated from its ſolutions by *Alkalis*, by *Lime* and other Earths, and by ſeveral other metals; the colour of the precipitates differing according to the degree of oxydation. The precipitate from the ſolution of *Nitrate of Quickſilver* by *Ammoniac*, is of a grey colour (*Hy-*

*drargyrus Precipitatus Cinereus* P. Edin.); from the ſolution of *Muriate of Quickſilver* of a pure white (*Hydrargyrus Præcipitatus albus* P. L.) The precipitates by Alkalis, when mixed with *Sulphur*, poſſeſs the power of exploding if expoſed to a gradual heat.

Combines readily with moſt of the metals, forming what are called *Amalgams*.

Unites with *Sulphur*, by trituration, into a black powder (*Hydrargyrus cum Sulphure* P. L.) by fuſion and ſublimation, into a red ſtriated maſs (*Hydrargyrus Sulphuratus ruber* P. L.) which may alſo be prepared by the diſtillation of a mixture of *Muriate of Quickſilver* and *Sulphuret of Antimony* (*Cinnabar Antimonii*).

Decompoſes the *Alkaline Sulphurets*, producing an *Æthiops* with *Sulphurets of Potaſh* and *of Soda*, and a factitious *Cinnabar*, with *Sulphuret of Ammoniac*.

Order of Attraction, in the moiſt way, *Sebacic Acid*, *Muriatic*, *Oxalic*, *Succinic*, *Arſenic*, *Phoſphoric*, *Sulphuric*, *Saccho-lactic*, *Tartareous*, *Citric*, *Nitric*, *Fluoric*, *Acetous*, *Boracic*, *Pruſſic*, *Carbonic*; in the dry way, *Gold*, *Silver*, *Platina*, *Lead*, *Tin*, *Zinc*, *Biſmuth*, *Copper*, *Antimony*, *Arſenic*, *Iron*, *Alkaline Sulphurets*, *Sulphur*.

Uſed

of

## Quicksilver

## Of Lead

There is an ore of Lead in union with Phosphoric Acid which is a very remarkable ore and generally of a Green colour —

All the Ores of this Metal very scarce except the 7th Variety, the Potters Lead Ore of Galena found in mineralization with Sulphur, which is found in such abundance as to make it an article of cheapness, which depends in some measure on the durability, and also upon the facility you come at it, as you have nothing to do but to roast it for the space of half an houre or so ——

You will be able to detect the presence of Lead in any kind of Liquor, by adding to it a few Drops of the Sulphuret of Ammoniac, but if it contains Bismuth that will also be precipitated, but you may know which metal it contained by taking the liquor and evaporating it, if Lead you will find it soft, if Bismuth fragile —

Sir I Newtons Fusible Metal is made by mixing Lead Tin and Bismuth together. —

Uſed principally in the working of *Gold Ores*, conſtruction of *philoſophical Inſtruments, and of Mirrors*; *in Gilding, Painting, Anatomy*, and *Medicine.*

## *Of Lead.*

Found 1ſt. *Native*, though very rarely; 2d. in union with Oxygen, Iron, and Alumine, *Red Lead Ore*; 3d. with Carbonic Acid, a little Lime and Alumine, *Spathoſe Lead Ore*; 4th. with Molybdic Acid, Iron and Silex, *Carinthian Molybdate of Lead*; 6th. with Sulphuric Acid, *Sulphate of Lead*; 7th. with Sulphur and a little Silver, *Galena*; and 8th. with Antimony and a little Silver, *Antimonial Lead Ore.*

Colour, *bluiſh-white*; *ſoft*, *flexible*, not *tenacious.*

Specific gravity 11.35.

Becomes dull on expoſure to *Air.*

Melts at about 540° of *Farenh.*—In a ſtrong heat boils, and if air be admitted, unites readily with different portions of *Oxygen*; hence the preparations of *Litharge* and *Minium*: by a ſtill

ſtill greater degree of heat may be converted into *Glaſs*.

Unleſs aſſiſted by heat, is not readily acted on either by the *Sulphuric* or *Muriatic Acid*. Diſſolves in diluted *Nitrous Acid*, and forms with it a cryſtalliſable ſalt. On expoſure to the vapour of *Acetous Acid*, is converted into a white *Oxyd* (*Ceruſſa* P. L.), the ſolution of which, in a freſh portion of this acid, produces a cryſtalliſable compound remarkable for its ſweetneſs and aſtringency (*Ceruſſa Acetata* P. L. *Aqua Lithargyri Acetati* P. L.)

Exhibits a browniſh colour when precipitated from its ſolutions by *Alkaline Sulphurets*.

By fuſion with the *Fixed Alkalis*, becomes partially ſoluble in *Water*; and may be oxydated by deflagration with *Nitre*.

Unites eaſily by fuſion with moſt of the metals, more eſpecially with *Gold*, *Silver*, *Tin*, and *Biſmuth*.

Produces with *Sulphur*, a grey coloured brittle compound, leſs fuſible than itſelf; with *Phoſphorus*, a compound which is malleable, but more diſpoſed to tarniſh.

## Of Lead

If you write upon paper with a solution of lead and only expose it to the vapour of the Sulphuret of Ammonia, it will become instantly brown. —

## Of Lead

In the making of Shot, a small quantity of Arsenic is added for the purpose of having the Shot in a more granulated form, and the only difference between patent and common Shot is in the former being more Spherical which is done by the Sieves it paſses through, being at a greater distance from the water, so that the Shop paſses through a large Colum of air, thereby giving it an opportunity of cooling more gradually —

## Of Copper

The *Oxyds* of this metal ſoluble in *Oils*, hence the preparation of certain *Plaiſters*, *Varniſhes*, and *Paints*; capable alſo of decompoſing ſeveral of the compounded ſalts, *Patent Yellow*.

Order of Attraction, in the moiſt way, *Sulphuric Acid*, *Sebacic*, *Saccho-lactic*, *Oxalic*, *Arſenic*, *Tartareous*, *Phoſphoric*, *Muriatic*, *Nitric*, *Fluoric*, *Citric*, *Formic*, *Lactic*, *Acetous*, *Boracic*, *Pruſſic* and *Carbonic*, *Potaſh*; in the dry way, *Gold*, *Silver*, *Copper*, *Quickſilver*, *Biſmuth*, *Tin*, *Antimony*, *Platina*, *Arſenic*, *Zinc*, *Nickel*, *Iron*, *Alkaline Sulphurets*, *Sulphur*.

Employed in medicine, and very extenſively in the arts, particularly in the conſtruction of *Buildings* and different *Utenſils*, in the making of *Shot*, in *Statuary*, *Glaſs-making*, *Glazing*, *Painting*, *Varniſhing*, Refinement of *Gold and Silver*, Compoſition of *Pewter* and *Soft-ſolder*, &c. &c.

## *Of Copper.*

Found 1ſt. *Native*; 2d. united to Oxygen, *Tile ore*; 3d. to oxygen and oxyd of Iron, *Pitch-Copper ore*; 4th. to Carbonic Acid, *red*, *green* and *azure Copper ores*; 5th. to Arſenic Acid, *Arſeniate of Copper*; 6th. to Sulphuric Acid, *Sulphate of Copper*; 7th. to Muriatic Acid, *Muriate of Copper*; 8th. to Sulphur, *Vitreous Copper ore*; 9th. to Sulphur and Iron, *Yellow Copper ore*; 10th. to Arſenic and Iron, *White Copper ore*, and, 11th. to Lead, Antimony, Iron, Sulphur, Silex and Silver, *Grey Copper ore.*

Colour, *reddiſh*. Taſte *nauſeous*, *Styptic*. Specific gravity 7.788.

*Hard*, *elaſtic*, *malleable*, and *ductile*. *Sonorous.*

Ruſts on expoſure to air.

If heated changes colour, and is converted into a browniſh red *oxyd*. Melts at 27° *Wedgw.* = 4587 *Farenh.*; and exhibits a bluiſh-green flame.

Soluble by the aſſiſtance of a boiling heat in concentrated *Sulphuric Acid*, forming with it a blue cryſtalliſable ſalt (*Cuprum Vitriolatum* P. L.)

Diſſolves very readily in the *Nitric Acid*, with a production of *Nitrous Gas*: the ſolution of a *deep blue* colour, and affords by evaporation a deliqueſcent ſalt, which detonates on being ſuddenly heated.

# Of Copper

To prepare the Cuprum Ammonicale take Sulphate of Vitriol and Carbonate of Ammoniac, but it is more elegant if you take a solution of the Sulphate of Copper, and adding to this a solution of Carbonate of Ammoniac, and lastly pouring a quantity of Spirits of Wine into the solution —

For ascertaining the presence of this metal in any solution, add to it a solution of Ammonia, when you will have a very beautiful blue solution, it at first appears turbid but by adding a greater quantity of the Ammonia it becomes blue. But you will have this blue appearance if Nickel was in the solution, you must therefore evaporate the liquor and have the metal in its Metallic state when you easily distinguish it —

of Copper

Is difficultly acted upon by *Muriatic Acid.* Colour of the diluted ſolution *green.*

By the *Acetous Acid* is rather corroded than diſſolved. If moiſtened with this Acid is, under expoſure to air, converted into a green ſaline *Oxyd* (*Ærugo* P. L.)

Is more or leſs acted upon by all the Alkalis. To the ſolution of Ammoniac it communicates a beautiful blue colour, which diſappears on the excluſion, and returns on the admiſſion of air.

May be precipitated from its ſolution in Sulphuric Acid, by Arſeniate of Potaſh, (*Scheele's green Pigment*): from Nitric Acid by Lime, (*Verditer*): from any of its ſolutions by Iron, (*Zement Copper*).

Detonates with melted *Nitre*, and, by the aſſiſtance of heat, decompoſes *Muriate* of *Ammoniac.*

Unites with many of the metals, and forms very important compounds, particularly with *Platina*, *Gold*, *Silver*, *Tin*, *Arſenic*, and *Zinc.*

Unites alſo, by fuſion, with *Sulphur* and with *Phoſphorus.*

The oxyds of this metal give a greeniſh tinge to *Glaſs.*

Order

Order of attraction, in the moiſt way, *Oxalic Acid*, *Tartareous*, *Muriatic*, *Sulphuric*, *Saccho-lactic*, *Nitric*, *Sebacic*, *Arſenic*, *Phoſphoric*, *Succinic*, *Fluoric*, *Citric*, *Formic*, *Lactic*, *Acetous*, *Boracic*, *Pruſſic*, *Carbonic*, *Potaſh*, *Ammoniac*, *Unctuous Oils*; in the dry way, *Gold*, *Silver*, *Arſenic*, *Iron*, *Mangane∫e*, *Zinc*, *Antimony*, *Platina*, *Tin*, *Lead*, *Nickel*, *Biſmuth*, *Cobalt*, *Quickſilver*, *Alkaline Sulphurets*, *Sulphur*.

Application very extenſive, employed chiefly in *Gunnery*, in the Conſtruction of *different Utenſils*, in the Compoſition of *Bell-metal* and *Alloys*, in *Enamelling*, *Dying*, *Painting* and *Medicine*.

## *Of Iron.*

Found 1ſt. *Native*; 2d. united to a ſmall proportion of Oxygen, *Grey Iron Ore*; 3d. to Carbonic Acid, and Alumine, *Hematite*; 4th. to Oxygen, Carbonic Acid, Alumine, and often Phoſphoric Acid, *Argillaceous Iron Ores*; 5th. to Lime, Carbonic Acid and Manganeſe, *Spathoſe Iron Ore*; 6th. to Sulphuric Acid, *Native Sulphate of Iron*; 7th. to Sulphur, *Pyrites*.

As obtained from its ores, by the uſual proceſs

Of Copper

Of Iron

On Iron

ceſs of reduction, aſſumes the form of *Crude Iron*, which freed from its impurities, by continued expoſure to the combined action of *Heat* and *Air*, and ſubſequent hammering or rolling, is converted into *Bar Iron.*

Colour of this *bluiſh white.* Specific gravity 7.788. *Hard*, *elaſtic*, *ductile*, *tenacious*, *magnetical.*

Ruſts eaſily on expoſure to *Air*, or application of *Moiſture* (*Rubigo Ferri* P. L.)

Is alſo, under acceſs of air, eaſily affected by *Heat*, undergoing various changes of colour from ſuperficial oxydation, long before it is ignited; but is extremely difficult of fuſion.

The only metal capable of combuſtion by *Colliſion.*

When heated ſo as to become ſoft, different portions may be united into one maſs by the operation of *Welding.*

If expoſed to *Oxygen Gas*, when ignited, burns with great brilliancy and rapidity, and is afterwards found to be *oxydated.*

The vapour of water applied to heated iron, alſo *oxydates* it, and furniſhes *Hydrogen Gas.* (Vide page 10.)

When heated in cloſe veſſels, for a certain length of time, in contact with *Charcoal*, acquires *Weight*, becomes *fuſible*, more *brittle* and *elaſtic*, and capable of contracting a great degree of *Hardneſs*, when ignited and ſuddenly cooled, *(Steel)*.

May afterwards be deprived of theſe properties by cementation with earthy infuſible powders, or the ſimple application of *Heat.*

Diſſolves more or leſs perfectly in all the *Acids.* With moſt of them, in the act of ſolution, produces *Hydrogen Gas.*

Requires the aſſiſtance of heat to decompoſe concentrated *Sulphuric Acid*, but diſſolves readily in it when diluted, and forms a pale green cryſtalliſable ſalt *(Ferrum Vitriolatum* P. L.) A ſimilar compound is obtained by the ſpontaneous decompoſition of Iron Pyrites, *(Copperas)*.

With *Nitric Acid* produces either a reddiſh brown or greeniſh ſolution, which changes to a bright red on the addition of *Carbonate of Potaſh*, or *Ammoniac.*

With

On Iron

The Sulphur which is in union with the Iron, decomposes the Atmosphere or Water to which it is exposed, and takes the form of Sulphuric Acid, which acting upon the Iron produces Copperas —

# On Iron

In the preparation of Vin: Ferri: the genuine Rhenish wine is the only kind that should be made use of —

Ink which turns ochre has too much Copperas in the preparation, and the best way to prevent this is to add a quantity of Spirits of Wine —

With the *Muriatic Acid,* a yellowiſh brown ſolution, miſcible with ſpirit of wine, (*Tinctura Ferri Muriati* P. L.)

Soluble by digeſtion in the *Acetous Acid*; hence the chalybeate properties communicated by it to different kinds of wine (*Vinum Ferri* P. L.)

Alſo eaſily acted on by Acid of Tartar (*Ferrum Tartariſatum* P. L.)

By uniting with *Pruſſic Acid,* forms *Pruſſian Blue.*

In combination with *Carbonic Acid* becomes ſoluble in water; hence the properties of *Chalybeate Springs.*

With *Gallic Acid* produces a black precipitate, the baſis of common *Ink.*

Precipitates ſpontaneouſly from moſt of its acid ſolutions on expoſure to *Air.* When thrown down from theſe by an *Alkali,* may be re-diſſolved by the addition of a further portion of it.

Combines with the *Fixed Alkalis* by fuſion.

Deflagrates with *Nitrate of Potaſh*; and ſublimes with *Muriate of Ammoniac,* which it partially decompoſes (*Ferrum Ammoniacale* P. L.)

When in the ſtate of *Oxyd*, promotes the fuſion of ſeveral of the *Earths*, and communicates different tinges to *Glaſs*, according to the degree of *Oxydation*.

Unites by fuſion with all the other metals, except *Quickſilver*, *Lead* and *Biſmuth*. In combination with Arſenic, becomes brittle when heated, *(Red-ſhort Iron)*.

Has of all metals the ſtrongeſt attraction for *Sulphur*, with which, when heated, it unites very readily.

Is alſo capable of entering into combination with phoſphorus, *(Cold-ſhort Iron)*.

*Bar-Iron*, *Steel*, and *Crude Iron*, conſidered as differing from each other principally in containing different portions of *Carbon*.

Order of Attraction, in the moiſt way, *Oxalic Acid*, *Tartareous*, *Sulphuric*, *Saccho-lactic*, *Muriatic*, *Nitric*, *Sebacic*, *Phoſphoric*, *Arſenic*, *Fluoric*, *Succinic*, *Citric*, *Formic*, *Lactic*, *Acetous*, *Boracic*, *Pruſſic*, and *Carbonic*; in the dry way, *Nickel*, *Cobalt*, *Manganeſe*, *Arſenic*, *Copper*, *Gold*, *Silver*, *Tin*, *Antimony*, *Platina*, *Biſmuth*, *Lead*, *Quickſilver*, *Alkaline Sulphurets*, *Sulphur*.

Uſes too extenſive to be enumerated.

On Iron

## On Tin

The most ancient and abundant mines in the world are those in Cornwall, from whence we are furnished with two kinds, the mine and Stream Tin Ore, the latter the most pure, and called Block Tin, the former Grey Tin —

To colour Pins, the Artists have nothing to do but to scour them, and put them into a strong Solution of Cream of Tartar and Tin, and in this he boils them for a little time —

# *Of Tin.*

Found either united with oxygen and iron, *Spathoſe Tin-ore*; or with Sulphur, Copper and Iron, *Tin Pyrites.*

Colour, *white.* Specific gravity 7.291.

*Soft. Malleable.* Of little *tenacity.* Slightly *ſonorous. Inelaſtic.* Makes a crackling noiſe on being bent.

Tarniſhes on expoſure to *Air.*

Melts at 410 of *Farenh.* and by the continuance of the heat, with acceſs of air, is eaſily converted into a white *Oxyd,* very difficult of fuſion, the baſis of common enamel.

In its tranſition from the fluid to the ſolid ſtate, may, by agitation, be readily reduced to powder, (*Pulvis Stanni* P. L.)

Decompoſes the *Sulphuric Acid* by the aſſiſtance of heat. Is by the *Nitric Acid* immediately, without heat, converted into a white *Oxyd.*

Diſſolves readily in the *Muriatic Acid,* with effervefcence, effervеſcence, and forms with it a cryſtalliſable compound.

Diſſolves alſo with ſtill greater rapidity in the *Oxy-muriatic Acid* and *Aqua Regia.* Theſe ſolutions remarkable for the property of giving a bright ſcarlet colour to the infuſion of *Cochineal* and ſome other analogous ſubſtances. When united with *Oxy-muriatic Acid*, in the dry way, produces a colourleſs liquor ſtrongly diſpoſed to aſſume the gaſeous form under the common preſſure of the Atmoſphere, *Smoaking Liquor of Libavius.*

May be corroded by the continued application of the *Acetous Acid* in the form of vapour.

Capable of being acidified by a proceſs ſimilar to that uſed for the preparation of *Arſenic Acid.*

Is little affected, in the dry way, either by *Alkalis* or *Earths*, but decompoſes the compounds of the former with the *Sulphuric Acid.* Detonates rapidly with *Nitre*; and decompoſes *Muriate of Ammoniac.*

In the moiſt way, may be made to decompoſe *Nitrate of Copper* with an impetuoſity productive of actual combuſtion.

Of Tin

Uf ölie

May be united with all the other *Metals*, and in all proportions, occaſioning in many of them an alteration in their malleability, fuſibility, ſpecific gravity, and hardneſs.

When melted with *Sulphur*, produces a dark ſtriated compound, which if prepared by ſublimation, is of a golden colour and ſpongy texture, *Aurum Muſivum*.

May alſo be combined with *Phoſphorus*.

Order of Attraction, in the moiſt way, *Sebacic Acid*, *Tartareous*, *Muriatic*, *Sulphuric*, *Oxalic*, *Arſenic*, *Phoſphoric*, *Nitric*, *Succinic*, *Fluoric*, *Saccholactic*, *Citric*, *Formic*, *Lactic*, *Acetous*, *Boracic*, *Pruſſic*, *Potaſh*, *Ammoniac*; in the dry way, *Zinc*, *Mercury*, *Copper*, *Antimony*, *Gold*, *Silver*, *Lead*, *Iron*, *Manganeſe*, *Nickel*, *Arſenic*, *Platina*, *Biſmuth*, *Cobalt*, *Alkaline Sulphurets*, *Sulphur*.

Employed in the compoſition of *Solder*, *Pewter*, *Bell-metal*, *Printer's Types*, &c. in the conſtruction of *Mirrors*, in *Tinning*, *Enamelling*, *Medicine*, &c.

The Semi-metals are, *Biſmuth*, *Nickel*, *Arſenic*, *Cobalt*, *Zinc*, *Antimony*, *Manganeſe*, *Tungſten*, *Uranite*, *Molybdena*, and *Manachanite*.

## *Of Biſmuth.*

Found 1ſt. *Native,* 2d. in union with Oxygen, *Native Oxyd,* 3d. with Sulphur, *Sulphuret of Biſmuth.*

Colour, *yellowiſh white.* — Specific gravity 9.822.

But little ſubject to tarniſh. Melts at 460 *Farenh.*

In cloſe veſſels ſublimes without alteration, and in cooling cryſtallizes into cubes.

If kept in fuſion with acceſs of *Air* is converted into a greeniſh grey *Oxyd.*—Heated to redneſs burns, with a ſmall blue flame, and emits yellowiſh ſmoke, condenſible into an *Oxyd* of a ſimilar colour, *(Flowers of Biſmuth),* which by increaſe of heat melts into a greeniſh *Glaſs.*

Diſſolves moſt readily in the *Nitric Acid,* and furniſhes a ſalt, which detonates readily when expoſed to ſudden *Heat*; and which may be decompoſed by the affuſion of *Water,* yielding a white *Oxyd, (Magiſtery of Biſmuth).* It may alſo be

Of Bismuth

Of Bismuth

be decompoſed by the *Alkalis* and *Alkaline Sulphurets.*

The precipitate by *Sulphuret of Ammoniac* of a ſimilar appearance to that which it produces in ſolutions of *Lead.*

Deflagrates with *Nitre,* without detonation, and is converted into an *Oxyd,* which facilitates the fuſion of the *Earthy Bodies,* and alſo of the other *metallic oxyds*; may therefore be uſed in place of *Lead* in the refinement of *Gold* and *Silver.*

Combines with moſt of the other *metallic Subſtances,* rendering them for the moſt part more fuſible.

Unites eaſily with *Sulphur* into a bluiſh-grey ſtriated compound.

Order of Attraction in the moiſt way, *Oxalic Acid, Arſenic, Tartareous, Phoſphoric, Sulphuric, Sebacic, Muriatic, Nitric, Fluoric, Saccho-lactic, Succinic, Citric, Formic, Lactic, Acetous, Pruſſic, Carbonic*; *Ammoniac*; in the dry way, *Lead, Silver, Gold, Quickſilver, Antimony, Tin, Copper, Platina, Nickel, Iron, Zinc, Alkaline Sulphurets, Sulphur.*

Uſed in the compoſition of *Pewter*, *Solder*, and *Printer's Types*, in *Aſſaying*, *Painting*, *Imitation of Silvering*, &c.

## Of Nickel.

Found 1ſt. alloyed by Iron, *Native Nickel*; 2d. in combination with oxygen, *Native Oxyd*; 3d. with Iron, Arſenic, Cobalt and Sulphur, *Kupfer-Nickel.*

Difficult to obtain it pure.—Colour *reddiſh white.*—Specific gravity 7.88. *Hard,* ſomewhat *malleable*, *magnetical.* Very difficult of *fuſion.*

Yields a green *Oxyd,* which communicates an hyacinthine tinge to *Glaſs.*

All its ſolutions of a green colour; that in the *Nitric Acid,* (in which it diſſolves moſt readily) affords rhombic cryſtals, and like the others changes to a blue on the addition of *Ammoniac.*

Detonates, like moſt other metals, with *Nitre.*

Unites by fuſion both with *Arſenic* and *Cobalt.* Unites alſo by fuſion with *Sulphur.*

Order of attraction, in the moiſt way, *Oxalic*

# Of Bismuth

# Of Nickel

The Regulus of Nickel obeys the Magnet as the Regulus of Iron, but it is a doubt whether this does not depend upon a certain proportion of Iron with which it is in almost an inseperable union, and Dr Babington has lately been informed by some of his Chemical Friends, that they have been able to seperate the Iron so as to leave the Nickel without the power of obeying the Magnet —

Of Nickel

Of Arsenic

*Acid, Muriatic, Sulphuric, Tartareous, Nitric, Sebacic, Phoſphoric, Fluoric, Saccho-lactic, Succinic, Citric, Formic, Lactic, Acetous, Arſenic, Boracic, Pruſſic, Carbonic, Ammoniac*; in the dry way, *Iron, Cobalt, Arſenic, Copper, Gold, Tin, Antimony, Platina, Biſmuth, Lead, Silver, Zinc, Alkaline Sulphurets, Sulphur.*

This metallic ſubſtance not as yet applied to any uſe.

## Of Arſenic.

Found 1ſt. alloyed by Iron, *Native Arſenic*; 2d. combined with Oxygen, *Native Oxyd*; 3d. with different proportions of Sulphur, *Realgar, Orpiment*; and 4th. with Sulphur, Iron and ſometimes Silver, *Miſpickel.*

Colour, *ſteel-grey.* Texture, *ſcaly.* Specific gravity 5.76. Much diſpoſed to tarniſh.

Volatile in cloſe veſſels at 356 of *Farenh.*

If expoſed to *Air* under the heat of ignition, burns with a blue flame, and is converted into a white *Oxyd (Common white Arſenic.)*

This

This ſoluble in about 15 times its weight of boiling water.—Taſte, *cauſtic.*—Leſs volatile than the *Regulus.*—Emits a garlic ſmell on the application of *Heat.*—*Vitreſcible.*—Promotes the fuſion of *Earthy Bodies.* When melted with *Sulphur,* produces different ſhades of colour, according to the degree of *Heat*; hence artificial *Orpiment* and *Realgar.*—By treatment with the *Nitric Acid,* becomes more completely *oxygenated,* (vide page 23).—Decompoſes *Nitre* in the dry way, producing a neutral cryſtalliſable ſalt, *Arſenical Salt of Macquer.*—If diſtilled with unctuous matter, reaſſumes the form of *Regulus.*

In its *metallic* ſtate, decompoſes moſt of the mineral acids; the *nitric* moſt readily.

Unites with moſt of the other *Metals*; rendering brittle thoſe which are ductile, and in a remarkable manner increaſing the fuſibility of ſome, and diminiſhing that of others.

To the red and yellowiſh metals communicates a ſilvery whiteneſs.

Soluble in *Alkaline Sulphurets.* Soluble alſo in *Unctuous Oils,* with which it forms a conſiſtent mixture.

Moſt

Of arsenic

## Of Arsenic

If you wish to detect the presence of Arsenic in any substance, it will be easy from the Vapour and Garlic smell it gives out on being heated, also the bright silver colour it gives to Copper when heated upon it with a little grease and Charcoal, and you may also now it by its turning black upon being exposed to the Vapour of the Volatile Liver of Sulpher —

## Of Cobalt

Moſt of the preparations of this metal in a high degree *noxious*, when ignorantly adminiſtered; the detection of their preſence therefore often of great moment.

Order of attraction, in the moiſt way, *Muriatic Acid*, *Oxalic*, *Sulphuric*, *Nitric*, *Sebacic*, *Tartareous*, *Phoſphoric*, *Fluoric*, *Saccho-lactic*, *Succinic*, *Citric*, *Formic*, *Lactic*, *Arſenic*, *Acetous* and *Pruſſic*, *Ammoniac*, *Unctuous Oils*, *Water*; in the dry way, *Nickel*, *Cobalt*, *Copper*, *Iron*, *Silver*, *Tin*, *Lead*, *Gold*, *Platina*, *Zinc*, *Antimony*, *Alkaline Sulphurets*, *Sulphur*.

Uſed principally in *Glaſs-making*, *Painting*, and *Medicine*.

## *Of Cobalt.*

Found 1ſt. alloyed with Arſenic, *Grey Cobalt Ore*; 2d. united to Oxygen, *Native Oxyd*; 3d. to Arſenic Acid, *Cobalt Bloom*; 4th to Sulphur, *Sulphuret of Cobalt*; and 5th. to Arſenic, Iron, and Sulphur, *White Cobalt Ore*.

Colour, *light grey*. Specific gravity 7.811. *Compact*, *brittle*.

Fuſes with difficulty. When heated in contact with air, yields a browniſh Oxyd, *Zaffre*, which fuſed with Silex produces a blue glaſs, *Smalt*.

Diſſolves with more or leſs facility in ſeveral acids; moſt eaſily in the *Nitric Acid*.

With the Muriatic and Oxy-muriatic Acids forms compounds, the reddiſh ſolutions of which, as often as expoſed to heat, change to a beautiful green, *Sympathetic Ink*.

Detonates feebly with *Nitre*.

Unites by fuſion with moſt of the other *Metals*.

Combines difficultly with *Sulphur*; more readily with *Alkaline Sulphurets*.

Its *Oxyd* ſoluble in *Ammoniac*.

Order of Attraction, in the moiſt way, *Oxalic Acid*, *Muriatic*, *Sulphuric*, *Tartareous*, *Nitric*, *Sebacic*, *Phoſphoric*, *Fluoric*, *Saccho-lactic*, *Succinic*, *Citric*, *Formic*, *Lactic*, *Acetous*, *Arſenic*, *Boracic*, *Pruſſic*, *Carbonic*, *Ammoniac*; in the dry way, *Iron*, *Nickel*, *Arſenic*, *Copper*, *Gold*, *Platina*, *Tin*, *Antimony*, *Zinc*, *Alkaline Sulphurets*, *Sulphur*.

Of Cobalt

Of Cobalt

Of Zinc

Uſed to colour *Glaſs,* in *Glazing, Enamelling, Painting, Waſhing,* &c.

## *Of Zinc.*

Found 1ſt. in combination with Oxygen, Oxyd of Iron, Silex, and Alumine, *Calamine*; 2d. with Carbonic Acid, Water, Silex and Iron, *Carbonate of Zinc*; and 3d. with Sulphuric Acid and Water, *Sulphate of Zinc.*

Requires for its reduction to be treated in cloſe veſſels.

Colour, *bluiſh-white.* Specific gravity 7,190.

Somewhat *malleable.* Texture *laminated.*

When heated is eaſily pulveriſed; and like iron is capable of decompoſing *Water.* Melts at about 700 of *Farenh.*

In contact with air, burns ſoon after ignition, with a brilliant flame, and furniſhes a white flocculent *Oxyd* (*Flores Zinci* P. L.), convertible by an increaſe of heat into a yellowiſh *Glaſs.*

Is readily acted on by Acids. During its ſolution in the *Sulphuric* and *Muriatic Acids, Hy-*

*drogen Gas* is evolved. Produces with the former Acid, a ſtyptic cryſtalliſable ſalt.

May be precipitated from its ſolutions by *Earths* and *Alkalis.*

Decompoſes, in the dry way, *Sulphate of Potaſh* and many other compounded ſalts. Detonates violently with *Nitre.* By ſimple trituration decompoſes *Muriate of Ammoniac.* Is alſo capable of precipitating *Alum,* in the moiſt way.

Unites with all the other metallic ſubſtances except *Biſmuth*; giving to *Copper* additional elaſticity, durability, and hardneſs.

In its *metallic form* cannot be combined with *Sulphur*; but when *oxydated* unites readily with it.

Order of Attraction, in the moiſt way, *Oxalic Acid, Sulphuric, Muriatic, Saccho-lactic, Nitric, Sebacic, Tartareous, Phoſphoric, Citric, Succinic, Fluoric, Arſenic, Formic, Lactic, Acetous, Boracic, Pruſſic* and *Carbonic, Ammoniac*; in the dry way, *Copper, Antimony, Tin, Quickſilver, Silver, Gold, Cobalt, Arſenic, Platina, Biſmuth, Lead, Nickel, Iron.*

Used in the Composition of braſs Pinchbeck.
And in Painting and Medicine.

Of

Of Zinc

Of Antimony

## *Of Antimony.*

Found 1ſt. *Native*; 2d. alloyed with Arſenic, *Native Arſenical Antimony*; 3d. in union with Oxygen, *Native Oxyd*; 4th. with Muriatic Acid, *Muriate of Antimony*; 5th. with Arſenic Acid and Sulphur, *Red Antimonial Ore*; 6th. with Sulphur only, *Grey Antimonial Ore*; and 7th. with Iron, Arſenic, Sulphur, and ſometimes Silver, *Plumoſe Antimonial Ore.*

Colour *ſilvery white.* Specific gravity 6.702. Texture *laminated. Very brittle.*

Melts ſoon after ignition. Is volatile in cloſe veſſels. When heated in contact with *Air*, is converted into a light white *Oxyd*, *Argentine Flowers of Antimony*, which are ſoluble in *Water*, and fuſible into an Hyacinthine *Glaſs*.

Decompoſes both the *Sulphuric* and *Nitric Acids*, the former with, the latter without, the aſſiſtance of *Heat*. Requires digeſtion for its ſolution in the *Muriatic Acid*; but in the *Oxy-muriatic* diſſolves with great facility.

Decompoſes, in the dry way, moſt of the ſaline compounds of the *Sulphuric Acid.* Detonates readily with *Nitre*; and decompoſes *Muriate of Quickſilver.*

Combines with moſt other *Metals.*

Unites with *Sulphur* in all proportions, and forms with it a grey ſtriated compound, *Antimony* of the ſhops.

This when expoſed for a continuance to low heat, yields a grey *Oxyd*, which by fuſion is converted into a yellowiſh *Glaſs* (*Vitrum Antimonii* P. E.)

If roaſted with *Hartſhorn*, and afterwards ignited, yields a white *Oxyd*, (*Pulvis Antimonialis* P. L. *Antimonium Calcareo-Phoſphoratum* P. E).

When deflagrated with *Nitre*, is more or leſs decompoſed according to the degree of combuſtion, (*Antimonium Calcinatum* P. L. *Antimonium uſtum cum Nitro* P. E. *Crocus Antimonii* P. L. and P. E.)

Reduced to powder and boiled in a ſolution of *Potaſh*, depoſits, on cooling, an orange coloured precipitate (*Kermes Mineralis Ph. Suec.*); on the addition of the Sulphuric Acid to the ſolution whilſt hot, a browniſh red precipitate, (*Sulphur Antimonii præcipitatum* P. L. and P. E.)

Of Antimony

Of Antimony

A mixture of *Crocus* of *Antimony* and *common Salt*, with the addition of *Sulphuric Acid*, produces, by diſtillation, a butyraceous compound (*Antimonium Muriatum* P. L. and P. E.), which on the affuſion of common water, or by the addition of Potaſh, furniſhes a white oxyd; *Powder of Algaroth.* The combination of this with acidulous Tartrite of Potaſh, forms a triple ſalt, (*Antimonium Tartariſatum* P. E.) Other Antimonial *Oxyds* give a ſimilar preparation, (*Antimonium Tartariſatum* P. L.)

Order of Attraction, in the moiſt way, *Sebacic Acid, Muriatic, Oxalic, Sulphuric, Nitric, Tartareous, Saccho-lactic, Phoſphoric, Citric, Succinic, Fluoric, Arſenic, Formic, Lactic, Acetous, Boracic, Pruſſic* and *Carbonic*; in the dry way, *Iron, Copper, Tin, Lead, Nickel, Silver, Biſmuth, Zinc, Gold, Platina, Quickſilver, Arſenic, Cobalt, Alkaline Sulphurets, Sulphur.*

Uſed in the compoſition of *Types*, in *Medicine*, &c.

## *Of Manganeſe.*

Found, 1ſt. *Native*; 2d. in union with Oxygen, *Native Oxyd*; and 3d. with Oxygen, Silex, Iron, and Alumine, *Siliceous Manganeſe.*

Colour, *dull white.* Texture *granular.* Specific gravity 6.850. *Hard. Brittle.*

Extremely difficult to fuſe; but very eaſily *oxydated.*

Soluble in the diluted *Sulphuric*, in the *Nitric*, *Muriatic*, and ſeveral other acids.

In the ſtate of *Oxyd*, occaſions in the *Muriatic Acid* a ſtriking change of properties, by imparting to it a portion of its *Oxygen.* Vide page 18.

Its action on the *Alkalis* not yet aſcertained.

When oxydated, decompoſes both *Nitrate of Potaſh* and *Muriate of Ammoniac*, in the dry way.

In this ſtate, unites by fuſion with the *Earthy Bodies*, and when added to *Glaſs*, either renders it colourleſs or communicates a violet tinge, according to the degree of *Oxydation.*

Unites alſo, by fuſion, with *Sulphur*, into a yellowiſh of Manganese

## Of Manganese

The lighter oxyds if mixed with Linseed Oil, will upon exposure to a slight degree of heat burst out into actual combustion —

## Of Tungsten

lowiſh-green maſs. By mixture with unctuous ſubſtances ſometimes occaſions *Inflammation.*

Combines in the metallic ſtate with moſt of the other *Metals,* rendering *Gold* and *Iron* more fuſible, *Copper* leſs.

Order of Attraction, in the moiſt way, *Oxalic Acid, Citric, Phoſphoric, Tartareous, Fluoric, Muriatic, Sulphuric, Nitric, Saccho-lactic, Succinic, Sebacic, Arſenic, Formic, Lactic, Acetous, Pruſſic* and *Carbonic;* in the dry way, *Copper, Iron, Gold, Silver, Tin, Alkaline Sulphurets.*

Employed principally in *Glaſs-making* and *Bleaching.*

## *Of Tungſten.*

Found in an acid form in combination with Lime, *Tungſtate of Lime;* and 2d. with Oxyd of Manganeſe and of Iron, Silex, and Tin, *Wolfram.*

Colour *ſteel grey.* Texture *granular.* Specific gravity 17.6.

Nearly *infuſible.*

Yields a yellow *Oxyd.*

Inſoluble in the *Sulphuric, Nitric, Muriatic,* and *Oxy-muriatic Acids.*

Combines with the other *Metals.* Does not leſſen the ductility of *Silver* or *Copper*; but renders *Iron, Tin, Biſmuth, Antimony,* and *Mangane* harder.

Order of Attraction, in the moiſt way, *Lime, Potaſh, Ammoniac*; in the dry way, *Potaſh, Lime, Iron, Mangane.*

Not as yet applied to any uſe.

## *Of Uranite.*

Found 1ſt. united to Carbonic Acid and a little Copper, *Calcolite*; and 2d. to Sulphur, *Pich Blende.*

Has not as yet been perfectly *metalliſed.*

## *Of Molybdena.*

Found in an acid form in combination with *Sulphur.*

Of Tungsten

Of Uranite

Of Molybdena

Of Molybdena

Of Manachanite

Colour *grey*. Specific gravity not aſcertained. *Brittle.*

Leſs fuſible than either *Platina* or *Manganeſe.*

Yields a white *oxyd* when heated in contact with *Air*, or digeſted in *Nitric Acid*, or deflagrated with *Nitre.*

When combined with *Iron*, *Copper*, and *Silver*, renders them friable.

In union with *Sulphur* regenerates *Sulphuret of Molybdena.*

Order of Attraction unknown.

Not yet applied to any uſe.

## *Of Manachanite.*

Found either amorphous, or in grains of a *grey* colour, *ponderous* and attractable by the *Magnet.*

Suppoſed to contain a *Metal* of a particular kind.

## OF INFLAMMABLE SUBSTANCES.

Theſe, ſuch as are more eſpecially remarkable for exhibiting the phenomenon of *Combuſtion*, when heated to a certain degree in contact with *Air*.

The changes produced on the *Air* in this proceſs, and the alteration which the *inflammable Subſtances* themſelves undergo, already particularly treated of. Vide page 7.

In their *Form*, *Conſiſtence*, *Weight*, *Volatility*, &c. the ſubſtances of this claſs differ widely from each other. They are comparatively *lighter* than moſt other bodies.

The principal mineral inflammable ſubſtances are, *Hydrogen Gas*, (vide page 11.) *Bituminous Bodies*, *Amber*, *Sulphur*, *Plumbago*, and the *Diamond*.

## *Of Bituminous Bodies.*

Found either liquid and devoid of colour, *Naphtha*; or more or leſs liquid and of a dark colour, *Petroleum*, *Barbadoes Tar*; or less liquid than this mat or ſolid, black, and

## Of Inflammable Substances

These are either simple or compound. Some of them emit light and heat in Oxygen, in this case there is no decomposition of the substance but an absorption of Oxygen. When they go into combustion they are decomposed and lose part of their substance. —

The simple Inflammable substances are, Hydrogen Gas, Phosphorous, Sulphur, Charcoal, Plumbago. —

## Of Bitumious Bodies

Coal has such an analogy to Charcoal, and it is supposed that all Coal has its origen from Wood. but the great quantity that has been found makes it appear difficulty to account in what manner the wood got collected—

You may know the goodneſs of Coal by mixing with it a quantity of Nitre. and that which burns with the greatest rapidity with the smallest quantity of Nitre is the best—

Of Bitumious Bodies

of umber

and of a compact or ſlaty texture, *Aſphaltum*, *Jet*, *Coal.*

The principle of *Inflammability* apparently the ſame in all, the more liquid being, by continued expoſure to *Air*, convertible into the more conſiſtent, and all yielding ſimilar products in diſtillation. In the different kinds of *Coal* there exiſts more or leſs *earthy* admixture, and often *Iron Pyrites.*

The *bituminous* bodies immiſcible with *Water* and inſoluble in *Spirit of Wine.*

They appear from a variety of circumſtances to be of *vegetable* origin.

## *Of Amber.*

Found for the moſt part in irregular maſſes more or leſs tranſparent, and of a browniſh or yellowiſh colour.—Specific gravity from 1.055 to 1.000. Emits a peculiar odour on friction and becomes *electric.* Melts at 550 *Farenheit.* Burns with a whitiſh flame. In diſtillation yields *Water*, *Empyreumatic Oil*, (*Oleum Succini* P. L.) and a concrete *Acid*, (*Sal Succini* P. L.) Vide page 22.

Inſoluble

Inſoluble in *Water* and nearly ſo in *Spirit of Wine*, alſo in all the acids, the *Sulphuric Acid* excepted, in the ſolutions of the *Alkalis*, and in *eſſential* and *expreſſed Oils*; but the *Balſams* diſſolve it readily.

Of the methods uſually employed for rendering *Amber* tranſparent.

This ſubſtance alſo, probably of *vegetable* origin.

## *Of Sulphur.*

Found either uncombined, or depoſited by water, or ſublimed by ſubterranean fire, *Native Sulphur*; or in combination with other bodies, more eſpecially with different *Metals*.

May be obtained artificially by the decompoſition of *Sulphuric Acid.*

Colour, *pale Yellow.*—Specific gravity 2.033. *Hard, brittle, inſipid, inſoluble.* Very eaſily melted. Sublimes in cloſe veſſels into light yellow flowers, (*Flores Sulphuris* P. L.)

Burns with a blue flame, and by abſorbing *Oxygen* from the Air, is converted into *Sulphure-*

*ous*

## Of Ambre

Ambergrese appears nearly allied to Amber, it is insoluble in water, but soluble in about 12 times its quantity of Alcohol, and is entirely soluble in Ether, Essential Oils &c. Its origin is not known, but it is supposed to be the Excrement of a Species of Whale

## Of Sulphur

Of Sulphur

*ous Acid Gas, Sulphureous* or *Sulphuric Acid,* according to the proportion of this principle.—Similar effects are produced on it by deflagration with *Nitre.*

Is little affected by *Acids.*

Unites readily with the *Alkalis,* and alſo with the *ſaline Earths,* producing liver-coloured compounds *(Sulphuret of Potaſh, &c.)* which are ſoluble in *Water,* and may be decompoſed by all the *Acids* (*Sulphur præcipitatum* P. L.).

When intimately mixed with certain proportions of *Potaſh* and *Nitre,* produces a compound which when gradually expoſed to heat explodes with great violence *(Pulvis fulminans).*

With *Nitre* and *Charcoal,* in mixture, it conſtitutes *common Gunpowder.*

Combines by fuſion with all the metals except *Platina, Gold,* and *Zinc.*

Is inſoluble in *Spirit of Wine,* but unites with *oily* matter of every kind, and with all the liquid *bituminous* bodies, into compounds of increaſed conſiſtence *(Balſams of Sulphur).*

Order of Attraction; in the moiſt way, *Lead,* *Tin, Silver, Quickſilver, Arſenic, Antimony, Iron, Potaſh, Ammoniac, Baryt, Lime, Magneſia, unctuous Oils, eſſential Oils, Æther, Spirit*; in the dry way, *Potaſh, Soda, Iron, Copper, Tin, Lead, Silver, Cobalt, Nickel, Biſmuth, Antimony, Quickſilver, Arſenic.*

Employed principally in *Bleaching*, in the manufacture of *Sulphuric Acid*, and of *Gunpowder*, frequently alſo in *Medicine.*

## *Of Plumbago.*

Found in different parts of the world, of different degrees of purity.

Colour, *blackiſh-blue.*—Feel, *unctuous.* Texture, *granular* or *compact.*—Specific gravity 2.00.

Inſoluble in *Water*, and unalterable on expoſure to *Air.*

When ignited in contact with this fluid, undergoes *ſlow Combuſtion*, leaving behind only a ſmall portion of *Oxyd* of *Iron.*

In cloſe veſſels it ſuffers no change.

It decompoſes *Sulphuric Acid* by the aſſiſtance of

Of Sulphur

Of Plumbago

## Of Plumbago

## Of the Diamond

The Diamond has Chemical properties analogous to Charcoal —

of heat, but is inſoluble either in the *Nitric* or *Muriatic Acid*, yet diſſolves in the *Oxy-muriatic Acid*, and on deflagration with *Nitre*, produces *Corbonate* of *Potaſh*.

From theſe and other circumſtances, conſidered as analogous to *Charcoal*.

Uſed in the manufacture of *Pencils*, *Razor-ſtrops*, *Crucibles* and other chemical veſſels, in poliſhing *Shot*, defending the ſurface of *Iron* from ruſt, leſſening the friction in mill-work, &c.

## Of the Diamond.

Found principally in certain parts of India, in cryſtals of different colours and ſizes.

Figure of its cryſtals *octohedral*. Specific gravity, 3.521. Hardneſs greater than that of any other body.

Aſcertained, by various experiments, to be capable of *Combuſtion*, but only in the moſt intenſe heats.

The *Sulphuric Acid* the only menſtruum that has any effect on this gem.

Valued chiefly on account of its *Splendour* and *Durability.*

The principal vegetable inflammable ſubſtances are, *Alcohol, Eſſential Oils, Balſams, Reſins, Expreſſed Oils, Camphor, Charcoal.*

## *Of Spirit of Wine (Alcohol).*

Obtained from ſuch ſubſtances as have undergone the *Vinous Fermentation,* of which thoſe containing *ſaccharine Matter* are alone ſuſceptible. This proceſs materially influenced by *Reſt, Dilution, Temperature,* and *Expoſure to Air.*

Repeated diſtillation and digeſtion on *Potaſh,* neceſſary to bring this fluid to its ultimate degree of purity.

When pure *colourleſs* and *tranſparent.*

Taſte *hot* and *pungent.* Specific gravity 0.817.

Miſcible with *Water* in all proportions.

Burns with a bluiſh flame, producing in combuſtion *Carbonic Acid Gas* and *Water.*

Undergoes

## Of the Diamond

## Of Alcohol

In the purification of Sp^t of Wine the best method is to mix with it a quantity of common Alum, and then to proceed to distillation as before —

Sp^t of Wine or pure Alcohol contains 51 parts of Oxygen. 37 of Carbone and 12 of Hydrogen. —

If pure and mixed with Gunpowder and set fire to it burns first and when all evaporated the Powder explodes. —

To detect the presence of Lead in Wines drop the following solution into any quantity when you will have a copious precipitate, Sulphuret of Lime gr 16 Cream Tart gr XX Aq Font ℥j this solution ought to be made at the time you are using it. —

## Of Alcohol

Æther is composed of the very same materials as Spirits of Wine but united in different proportions. Water will dissolve about one tenth of Æther. Æther is decomposed in the exp. muriatic acid and is a very beautiful experiment. If a solution of gold be added to Æther it is decomposed, and the acid falls to the bottom colourless, while the gold is held in solution in the Æther and if this is laid upon a metal the Æther will be decomposed and a layer of gold will cover its surface.—

## Of Essential Oils

These oils possess the same [illegible] odour as the vegetable we get them from.—

By long keeping and exposure to the air they lose some of their distinguishing properties, as flavour, smell & consistence are changed, they becoming inodorous and thickened.—

They are sometimes contaminated with oil of turpentine and unctuous oil, the way to know this is to drop them into Spts of Wine when the liquor will become [illegible] if either of these unctuous oils [illegible] in, the Oil Turpentine being an

Undergoes ſingular changes in its properties by treatment with the different *Acids*; hence the preparation of *Æthers*, *Oleum Vini*, &c.

Diſſolves the *Alkalis*, and many of the *compounded neutral Salts*, particularly ſuch as are deliqueſcent. Alſo diſſolves *Soap*, and acts readily as a ſolvent on *Eſſential-Oils* and *Reſins*, on *Balſams* and on *Camphor*; hence the preparation of various *Spirituous Liquors*, *Tinctures*, *Varniſhes*, &c.

Conſidered by *Mr. Lavoiſier* and others, as a compound of *Hydrogen*, *Carbon*, and *Oxygen*, produced by the decompoſition of the ſugar, in the act of *Fermentation*.

Order of Attraction, *Water*, *Æther*, *Eſſential Oils*, *Ammoniac*, *Potaſh*, *Alkaline Sulphurets*, *Sulphur*.

In general uſe for various *technical* as well as *dietetical* and *medical* purpoſes.

## *Of Eſſential Oils.*

Obtained from moſt fragrant vegetables, by expreſſion, or diſtillation with *Water*.

Taſte *pungent.* Odour, colour, and conſiſtence, *various.* Moſt of them lighter, ſome few heavier than *Water.* as Ol: Sassafras &c—

Thicken and become inodorous when expoſed to *Air.* By absorbing Oxygen—

Sparingly ſoluble in *Water*; but readily ſo in *Spirit.*

*Volatile* in cloſe veſſels, without decompoſition, but highly *inflammable* when heated in contact with *Air.*

Decompoſe the ſtronger *Acids*; in ſome inſtances with ſuch rapidity as to occaſion actual *Combuſtion.*

May be united with the *Alkalis* and *Lime* ſo as to form *Soaps.*

Combine intimately with *Sulphur.*

Combine alſo with *Phoſphorus*, *Unctuous Oils*, and *Camphor.*

Purity aſcertained by ſolution in *Spirit*, or expoſure to *Heat.*

Nature of their compoſition not yet thoroughly inveſtigated; but ſuppoſed to be compounds of *Carbon* and *Hydrogen.*

*Of*

eſsential oil does not produce this effect, but its presence may be known by the smell, or by dropping them on paper and holding them above a candle, if only eſsential oil the paper is not greasy after the evaporation, but if containing unctuous oil it will appear stained greasy.

Of Balsams and Resins

Of Unctious Oils

## *Of Balſams and Reſins.*

Theſe alſo vegetable products, differing from each other principally in reſpect to conſiſtence.

In moſt of their properties, they are analogous to the foregoing, which aſſume theſe forms when combined with different portions of *Oxygen.*

Of theſe and the *Eſſential Oils* the uſes various.

## *Of Unctuous Oils.*

Obtained, ſometimes by boiling, but moſtly by preſſure, from certain *Fruits, Kernels, Pippins,* and *emulſive Seeds.*

*Inſipid. Inodorous. Unctuous.* Colour and conſiſtence various. Specifically lighter than *Water.*

Inſoluble both in *Water* and *Spirit.*

Become rancid and more conſiſtent, on expoſure to *Air,* apparently by the abſorption of *Oxygen.*

Yield, by diſtillation in cloſe veſſels, an acid

*Phlegm*, a lighter and a denſer *Oil*, a large quantity of *Hydrogen Gas* mixed with *Carbonic Acid Gas*, and leave behind a ſmall proportion of *Charcoal.*

Afford *Water* and *Carbonic Acid Gas* by inflammation in contact with *Air*.

By mixture with the ſtronger *Acids*, produce, in ſome inſtances, *ſaponaceous Compounds*; in others, occaſion *Combuſtion*.

Unite more perfectly with the *Alkalis*, more eſpecially with *Potaſh* and *Soda*; with the latter, form common *Soap*.

Unite alſo into ſaponaceous compounds with *Baryt*, *Lime*, and *Magneſia*.

Have no action on any of the *Metals* except *Copper* and *Iron*, but aſſiſted by heat diſſolve moſt of the *metallic Oxyds*, and when ſeparated again from theſe, are found to be ſoluble in ſpirit of wine.

Form with *Sulphur* a browniſh red fluid of a diſagreeable ſmell (*Balſamum Sulphuris* P. L.) Combine alſo by the aſſiſtance of heat, with moſt of the *Bituminous Bodies*.

Conſidered as differing principally from the *Eſſential Oils*, in containing different portions of *Mucilage*.

Employed

Of Unctious Oils

## Of Camphor

Camphor burns upon the contact of flame, but does not when applied to a [illegible] heat, it all flying off in vapour. —

Employed in *Painting*, *Varniſhing*, *Soap-making*, in *Mechanics*, for *Fuel*, in *Diet*, *Medicine*, &c.

## *Of Camphor.*

Obtained by diſtillation with water, from a particular ſpecies of laurel, *(Laur. Camph. Lin.)* and ſome other vegetables.

Requires the addition of a ſmall quantity of *Lime*, in its ſubſequent refinement by ſublimation.

*White*. *Tranſparent*. *Friable*. Taſte *pungent* and *bitteriſh*. Specifically lighter than *Water*.

Evaporates completely if kept expoſed to the air.

Burns with a white flame, and is entirely conſumed.

Sparingly ſoluble in *Water*; but readily ſo in *Spirit of Wine*, and *Æthers*, in *Unctuous* and *Eſſential Oils*.

Diſſolves both in the *Sulphuric* and *Nitric Acid*, without decompoſition; by repeated diſtillation with the latter, is converted into a peculiar *Acid*. Vide page 36.

Chiefly employed in medicine.

## *Of Charcoal.*

Obtained from *Vegetable*, *Animal*, and *Bituminous* ſubſtances, by incomplete combuſtion, or by the application of heat in cloſe veſſels.

Varies in its form, quantity, and purity, according to the nature of the ſubſtance from which it is prepared.

The charcoal of common wood, *black*, *light*, *brittle*, *ſonorous*, *inſipid*, *inodorous*, and of great *durability*.

Capable of ſuſtaining the moſt intenſe degrees of *Heat* in cloſe veſſels, without alteration; but upon acceſs of *Air*, burns with a white flame, and yields *Carbonic Acid Gas*, leaving behind a ſmall quantity of *earthy ſaline Aſhes*.

Decompoſes the *Sulphuric Acid* and all its compounds, by the aſſiſtance of *Heat*.

Decompoſes alſo the *Nitric Acid* without *Heat*, and ſometimes with ſuch rapidity as to occaſion *Combuſtion*. Detonates with *Nitre*.

Diſſolves, by fuſion, in the *fixed Alkalis*; very readily alſo in *Alkaline Sulphurets*.

# Of Charcoal

It is one of the worst conductors of heat we know of, and has been proposed to be used to coat furnises with in Chimical processes. —

Charcoal is found in it's purest form in the Diamond and by combustion the Diamond may be wholly formed into Carbonic Acid Gas. —

Of Charcoal

Of Fat

Poſſeſſes the remarkable property of correcting *Fœtor*, and of depriving many ſubſtances of *Colour*, eſpecially when uſed in its freſh-burnt ſtate.

Uſed chiefly as an article of *Fuel* for culinary purpoſes, and in certain arts, trades, and manufactures.

The principal animal inflammable ſubſtances are *Fat*, *Butter*, *Bees-wax*, *Sperma-ceti*, and *Phoſphorus*.

## *Of Fat.*

Found in the adipoſe membrane of animals, of different colours and conſiſtence according to the part, the age, and the ſpecies, of the animal from which it is obtained.

When freſh, *unctuous*, *inſipid*, *inodorous*. *Inſoluble* both in *Water* and *Spirit* of *Wine*.

Becomes rancid by keeping.

Liquifies in a moderate heat, and congeals by cooling.

Yields by diſtillation in a water-bath, an *Aqueous Liquor*, which contains *Mucus*, and is much diſpoſed to become putrid. By ſimple diſtillation

tion affords a peculiar *Acid* (vide page 41), an *Oil* partly liquid and partly concrete, and leaves a ſmall proportion of *Charcoal.*

Burns readily in contact with *Air.*

Forms ſaponaceous compounds with the ſtronger *Acids*, *Alkalis*, and *Lime.*

Acts on *Lead*, *Copper*, and *Iron*, in their metallic form, and on the *Oxyds* of theſe and moſt of the other *Metals.*

Combines in all proportions, as well with the *Eſſential* as with the *Unctuous Oils.*

Combines alſo intimately with *Sulphur.*

Conſidered as differing from *Unctuous Oils*, principally, in the peculiar *Acid* which it yields.

Uſes nearly the ſame.

## *Of Butter.*

Collected from milk after the ſpontaneous ſeparation of its conſtituent parts.

Differs in no material reſpect from the foregoing, either in its properties or uſes.

Of Fat

Of Butter

# Of Bees-Wax

Lac very much resembles wax, and it is deposited by Insects on the bows of plants, in other Countries. —

# Of Sperma-ceti

## *Of Bees-Wax.*

Depoſited by the *Bee* in the conſtruction of the *Honey-comb.* Colour *yellow.* Taſte *inſipid.* Inſoluble in *Water.*

Becomes white on expoſure to *Air*, or treatment with the *Oxy-muriatic Acid.* Gas.

Yields in diſtillation an *acid Phlegm*, a *Butyraceous Oil*, and a ſmall quantity of *Charcoal.*

Unites with the *Alkalis* and forms *Soap.*

Combines in all proportions with *Oils*, *Reſins*, and *Fat*; hence the preparation of ſeveral *Cerates*, *Ointments*, and *Plaiſters.*

Employed alſo in ſeveral of the arts, but principally in making *Wax candles.*

## *Of Sperma-ceti.*

Obtained from the brain of a particular ſpecies of whale, (*Cetus dentatus Lin.*) thence called the Sperma-ceti whale; obtained alſo in ſmall quantity from the oil of the ſame fiſh. and from the oil of some other fish. — —

After

After refinement, *white*, *ſemitranſparent*, *cryſtalline*, *friable*, *inſipid*, *inodorous*, *inſoluble* in *Water*.

Changes colour and becomes rancid by keeping.

Little altered by diſtillation, nor eaſily acted upon by *Acids* or *Alkalis*.

Combines in all proportions with *Sulphur*; alſo with *Unctuous* and *Eſſential Oils*, *Reſins* and *Animal Fat*, like the foregoing.

Suppoſed to have the ſame relation to *Unctuous Oils* that *Camphor* has to the *Eſſential*.

Uſed chiefly for making Sperma-ceti candles, and in the compoſition of *Ointments*, *Plaiſters*, & medicine &c.

## *Of Phoſphorus.*

Obtained, by decompoſing calcined *Bones* by means of diluted *Sulphuric Acid*, evaporating the ſupernatant liquor to the conſiſtence of a ſyrup, mixing it with powdered *Charcoal*, and diſtilling in the open fire; or by adding *Nitrate* or *Acetite* of *Lead*

## Of Sperma-ceti

## Of Phosphorus

Under a slow Combustion Phosphorous acid is formed, while under a rapid one the Phosphoric Acid. — It is not diſsolved in water altho' a small quantity of it may be held in solution in water. It may be diſsolved in Eſsential Oils and Ether. Alcohol also diſsolves it, and when the solution is dropped into water it makes the water appear luminous. It may be diſsolved by divers of the gaſes without undergoing combustion. If you put Phosphorus in a bottle and cover it with lime and stopp it closely, and apply a slight degree of heat, it will light matches when rubbed upon it. — Phos'rate of lime when dropped into water forms the Phos'horated hydrogen Gas, which no sooner comes in contacts with the air than it takes fire and detonates —

# Of Phosphorus

By striking Phosphorus [illegible] with the [illegible] of lead, quicksilver or Silver together with a hammer, a violent detonation takes place. —

*Lead* to common *Urine*, collecting the precipitate, mixing this with *Charcoal* and diſtilling as above.

Purified by cautious re-diſtillation, or ſtraining it, when melted, through leather.

Colour *pearly-white*. *Semitranſparent*. *Waxy*. *Inſoluble* in *Water*. Very *fuſible*.

When expoſed to air, at a low temperature, emits a white fume, and is luminous in the dark; if heated, burns with great rapidity; and in both caſes acquires acid properties. Vide page 37.

Decompoſes the *Nitric Acid*, occaſioning combuſtion by the ſudden ſeparation of its *Oxygen*.

By treatment with the *fixed Alkalis* or *Lime*, yields a permanently elaſtic fluid, which explodes on admiſſion of *Air* (*Phoſphoric Gas*).

Diſſolves in *Eſſential* and *Unctuous Oils*, *Spirit* of *Wine*, and *Æthers*.

Unites by fuſion with *Sulphur*.

Unites alſo with ſeveral of the *Metals*, and decompoſes moſt of their *Oxyds*.

Uſed only in the preparation of *liquid Phoſphorus*, *Phoſphoric Matches*, and portable *Phoſphoric Bottles*.

## OF SPONTANEOUS ANALYSIS.

### (*Fermentation.*)

Organiſed bodies, or their products, alone capable of becoming the ſubjects of this *Analyſis*.

Takes place under particular circumſtances of *Temperature*, *Humidity*, *Accumulation*, and *Expoſure to Air*.

Diviſible into different ſtages; the *Vinous*, productive of *Alcohol*; the *Acetous*, affording *Vinegar*; and, the *Putrid*, generating *Ammoniac*.

Theſe changes may be promoted or retarded by various means. *Ferments*.

## Of Phosphorus

## Of Spontaneous Analysis

## Of Animal Matter.

Coagulable lymph affords Ammonia on distillation it is insoluble in Alcohol or water. In Caustic Alkalies it forms soap. Albumen is that which separates from the coagulable lymph called also Serum, all the white of an Egg is nearly of this substance. It coagulates at about 160 Degrees of heat, when coagulated it is insoluble in water, but concentrated Alkalies and Earths dissolve it. In many respects it resembles Vegetable Gluten. Gellity is got by boiling animal substances, in great quantity as tendons &c Glue is solid Gellity, It is soluble in Alkalies and Acids but not Alcohol — —

## Vegetable Matter

Gum is in a state of solution in Vegetables, but oozes out when exposed to heat, it is soluble in Water in all proportions, but not at all in alcohol. It softens and swells when applied to heat, but neither burns or melts. Gluten is insoluble in cold water, but soluble in oils, alcohol, Ether and hot Water,

# Of the Analysis of Mineral Waters

[illegible] then in a plainer way we have spoken on this subject. Water is a fluid which is capable of uniting with a variety of ingredients, and of holding many in solution. Waters are divided most naturally as they fall from the heavens in the form of Rain, Hail, Snow &c. We have Spring water, water from Lakes and the great body of the Ocean. River Water is found purer than the purest Spring. And the more hard the faster and rapid the force of the River the purer the Water. The more stagnant the more impure. The Sea water is made salt with muriat of Soda, also muriat of magnesia, and Lime and the Sulphate of magnesia, and it is this which renders it bitter. Another distinction is in regard to the temperature. In some parts of Italy the Sea is warm at the coming from being near burning Volcanos. But we find in Springs, some as high as the 212 and some as low as the 50th or lower and this temperature never varies in winter or Summer. The most remarkable Springs of the hot kind, Matlock, Buxton and at Bath, some foreign Springs are hotter than these, as at Geyser in Iceland, where it is constantly at the boiling point. The cause of these Springs never varying in their temperatures, at Bath there are extensive strata of Lime in a caustic state, and the Water coming into contact with it, it is slaked with increase of temperature, but this does not account for the uniformity of temperature. Spring Water the hardest, River water next, Rain water next and the softest of the Four is Distilled water, and their hardness depends upon their containing either some loose acid, or more

## Vegetable matter continued.

Starch is insoluble in cold water or Alchol, but in hot water it forms a jelly. Tanning resides in those Vegetables which are the most astringent, any Animal Jelly as a solution of Isinglass &c. shows the presence of this by an insoluble precipitate being deposited. India Rubber oozes out of some plants, it is insoluble in water, and in Acids when cold, but when heated is soluble in the Sulphuric and Nitric, Oils, Alkalis and Others dissolve it. It melts at the same temperature as Resins, but never again regains its elasticity. —

# OF THE ANALYSIS OF MINERAL WATERS.

Firſtly, by *Teſts* or *Re-agents.*

Secondly, by *Diſtillation* and ſubſequent examination of their *gaſeous* and *ſolid* contents.

THE END.

—generally from its holding, in solution some Mettalic or Earthy salts more especially Earthy Salts, therefore by adding Wood ashes to Water (Alkali) it is rendered soft, by the Alkalie taking up the salt in question. Medical Distinction, Acidulous Waters, are rendered so by containing Carbonic Acid Gas, and almost all waters are impregnated with it, it is this which renders Water so sparkling and pleasant, being rather sour, this is called Seltzer water, and may be made artifically so fine as not to be distinguished from it by the nicest judges. Hepatic Waters are those impregnated with Hepatic Gas, the most remarkable are Harrowgate and Nettlestead, this also contains a quantity of saline matter. Saline Waters are Epsom &c, and this contains the Sulphate of Magnesia; Cheltenham also contains this and the Sulphate of Soda, it is also Chalybeat. — Chalybeat Waters have their characters from the presence of a quantity of Iron. These Springs are numerous; the most reputed are those of Tunbridge Wells but this arises from the situation, more than the quality of it above others —

# Mineral Waters Continued.

The principal distinction, is whether these hold in soluti
the Sulphate or of Carbonate of Iron. On Examination
Mineral Waters. The substances we expect to
find are certain loose Acids, Alkalies, Earthy
bodies, and Metallic bodies, more especially Iron
Aeriform substances are also contained in them.
The Chemical tests are, for Acids, the Infus
of Litmus, but the Test for ascertaining the pre
of Carbonic Acid gas, is the Lime Water, but be
the Mineral Water, and at first you will hav
a white precipitate, but if you add a greater
proportion ~~the~~ acid will dissolve the precipitate
and render it again colourless. To ascertain the
presence of an Alkalie, add to it either the syr
of Violets, or paper stained with Turmeric, the Vi
will be stained green, and the paper pink. The
presence of Iron is ascertained by adding to it
either ~~[illegible]~~ Tinct of Galls, or Prussiate
of Lime. The prussiate of lime makes the liquor
a beautiful blue. For ascertaining the presence
of Lime add to it a small quantity of the Acid
of Sugar, when there will be a white deposition.
If for the presence of Earths add the fixed Alka
when there will be a copious precipitation. For
ascertaining any of the soluble forms of Baryt
add to it, Sulphuric Acid, when a white insolu
compound is produced. The Nitrate of Silver a
very delicate test for ascertaining the Muriatic
Acid in any form, for it precipitates a white
compound. Hepatic Gas is known by its colouring Sil
black, and also by its changing the colour of Arseni
You collect the Gasses by heat, and those you must
look for are Common Atmospherical Air, Carbonic Acid Ga
and Hepatic Gas. Atmospherical Air is known by Anima
and combustion living in it. Carbonic Air by its being rapi
absorbed by water, heavier than Atmospherical air, and chan
an Infusion of litmus red destroying light and life. Hepatic Gas
by its smell, and changing Oxyd of Arsenic and Silver black. —

Finis

# CHEMICAL NOMENCLATURE.

Tab. I.

| | SIMPLE BODIES | | —— RENDERED INTO GAS BY CALORIC. | | —— COMBINED WITH OXYGEN. | | —— GASEOUS OXYGENATED. | | —— OXYGENATED WITH BASES. | | —— COMBINED, BUT NOT RENDERED ACID. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *NEW NAMES.* | FORMER NAMES. | *NEW NAMES.* | FORMER NAMES. | *NEW NAMES.* | FORMER NAMES. | *NEW NAMES.* | FORMER NAMES. | *NEW NAMES.* | FORMER NAMES. | *NEW NAMES.* | FORMER NAMES. |
| | Light. | | | | | | | | | | | |
| | Caloric. | *Matter of heat.* | | | | | | | | | | |
| | Oxygen. | *Baſe of vital air.* | Oxygen gas. | *Dephlogiſticated air.* | | | | | | | | |
| | Hydrogen. | *Baſe of inflammable air.* | Hydrogen gas. | *Inflammable air.* | Water. | *Water.* | | | | | | |
| ACIDIFIABLE BASES. | Azote, *or* Nitre radical. | *Baſe of phlogiſticated air.* | Azotic gas. | *Phlogiſticated air.* | Baſe of nitrous gas.<br>Nitric, and nitrous acid. | *Baſe of nitrous air.*<br>*Dephlogiſticated and phlogiſticated nitrous acid.* | Nitrous gas.<br>Nitrous acid gas. | | Nitrate of potaſh.<br>Nitrate of ſoda, &c.<br>Nitrite of potaſh, &c. | *Common nitre.*<br>*Cubic nitre,* &c. | Ammoniac. | |
| | Carbon, *or* Carbonic radical. | *Pure charcoal.* | | | Carbonic acid. | *Fixed air.* | Carbonic acid gas. | *Fixed air,* or *aërial acid.* | Carbonate of lime, potaſh, iron, &c. | *Mild calcareous earth, mild alkali,* &c. | Carburet of iron. | *Plumbago.* |
| | Sulphur, *or* Sulphuric radical. | | | | Sulphuric acid.<br>Sulphureous acid. | *Vitriolic acid.*<br>*Volatile vitriolic acid.* | Sulphureous acid gas. | *Sulphureous acid gas.* | Sulphate of potaſh, &c.<br>Sulphite of potaſh, &c. | *Vitriolated tartar,* &c.<br>*Stahl's ſulphureous ſalt,* &c. | Sulphuret of iron, antimony, &c.<br>Sulphurated hydrogen gas.<br>Sulphurate of potaſh, ſoda, &c. | *Iron pyrites, common antimony,* &c.<br>*Hepatic gas.*<br>*Alkaline hepars.* |
| | Phoſphorus, *or* Phoſphoric radical. | | | | Phoſphoric acid.<br>Phoſphorous acid. | *Phoſphoric acid.*<br>*Volatile phoſphoric acid.* | | | Phoſphate of potaſh, ſoda, &c.<br>Phoſphite of potaſh, ſoda, &c. | *Phoſphorated kali, ſoda,* &c. | Phoſphorized hydrogen gas.<br>Phoſphuret of iron. | *Phoſphoric gas.*<br>*Syderite.* |
| | Muriatic radical. | | | | Muriatic acid.<br>Oxy-muriatic acid. | *Marine acid.*<br>*Dephlogiſticated marine acid.* | Muriatic acid gas.<br>Oxy-muriatic acid gas. | *Marine acid gas.*<br>*Dephlogiſticated marine acid gas.* | Muriate of potaſh, ſoda, &c.<br>Oxy-muriate of potaſh, &c. | *Salt of ſylvius, Common ſalt,* &c. | | |
| | Boracic radical. | | | | Boracic acid. | *Sedative ſalt.* | | | Borate of potaſh, ſoda, &c. | *Vegetable borax, Common borax,* &c. | | |
| | Fluoric radical. | | | | Fluoric acid. | *Spathic acid.* | Fluoric acid gas. | *Spathic acid gas.* | Fluate of lime, &c. | *Fluor ſpar,* &c. | | |
| | Succinic radical. | | | | Succinic acid. | *Salt of amber.* | | | Succinate of potaſh, &c. | | | |
| | Acetic radical. | | | | Acetous acid.<br>Acetic acid. | *Diſtilled vinegar.*<br>*Radical vinegar.* | | | Acetite of potaſh, ammonia, lead, &c.<br>Acetate of potaſh, &c. | *Diuretic ſalt.*<br>*Mindererus ſpirit.*<br>*Sugar of lead,* &c. | | |
| | Tartaric radical. | | | | Tartareous acid. | | | | Acidulous tartrite of potaſh.<br>Tartrite of potaſh.<br>Tartrite of ſoda. | *Cream of tartar.*<br>*Soluble tartar.*<br>*Rochelle ſalt.* | | |
| | Pyro-tartaric radical. | | | | Pyro-tartareous acid. | *Empyreumatic acid of tartar.* | | | Pyro-tartrite of potaſh, &c. | | | |
| | Oxalic radical. | | | | Oxalic acid. | *Acid of ſugar.* | | | Acidulous oxalate of potaſh.<br>Oxalate of ſoda, lime, &c. | *Salt of ſorrel.* | | |
| | Gallic radical. | | | | Gallic acid. | *Acid of galls.*<br>*Aſtringent principle.* | | | Gallates of potaſh, lime, iron, &c. | | | |
| | Citric radical. | | | | Citric acid. | *Acid of lemons.* | | | Citrate of potaſh, lime, &c. | | | |
| | Malic radical. | | | | Malic acid. | *Acid of apples.* | | | Malate of potaſh, &c. | | | |
| | Benzoic radical. | | | | Benzoic acid. | *Acid,* or *flowers of benjamin.* | | | Benzoate of lime, &c. | | | |
| | Pyro-lignic radical. | | | | Pyro-ligneous acid. | *Acid of wood.* | | | Pyro-lignite of potaſh, iron, &c. | | | |
| | Pyro-mucic radical. | | | | Pyro-mucous acid. | *Spirit of honey, ſugar,* &c. | | | Pyro-mucite of magneſia.<br>Ammoniacal pyro-mucite, &c. | | | |
| | Camphoric radical. | | | | Camphoric acid. | *Acid of camphor.* | | | Camphorate of potaſh, &c. | | | |
| | Lactic radical. | | | | Lactic acid. | *Acid of milk.* | | | Lactate of potaſh, &c. | | | |
| | Saccho-lactic radical. | | | | Saccho-lactic acid. | *Acid of ſugar of milk.* | | | Saccholate of lime, &c. | | | |
| | Formic radical. | | | | Formic acid. | *Acid of ants.* | | | Formate of ammonia, &c. | | | |
| | Pruſſic radical. | | | | Pruſſic acid. | *Acid of Pruſſian blue.* | | | Pruſſiate of potaſh, of iron, &c. | *Pruſſian alkali.*<br>*Pruſſian blue.* | | |
| | Sebacic radical. | | | | Sebacic acid. | *Acid of fat.* | | | Sebate of ſoda, of lime, &c. | | | |
| | Lithic radical. | | | | Lithic acid. | *Acid of urinary calculus.* | | | Lithiate of ſoda, &c. | | | |
| | Bombic radical. | | | | Bombic acid. | *Acid of ſilk worm.* | | | Bombiate of iron, &c. | | | |

# CHEMICAL NOMENCLATURE.

Tab. II.

| | SIMPLE BODIES | | — RENDERED INTO GAS BY CALORIC. | | — COMBINED WITH OXYGEN. | | OXYDS WITH DIFFERENT BASES. | | SIMPLE BODIES OXYGENATED WITH BASES. | | — COMBINED, BUT NOT RENDERED ACID. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *NEW NAMES.* | FORMER NAMES. | *NEW NAMES.* | FORMER NAMES. | *NEW NAMES.* | FORMER NAMES. | *NEW NAMES.* | FORMER NAMES. | *NEW NAMES.* | FORMER NAMES. | *NEW NAMES.* | FORMER NAMES. |
| METALLIC SUBSTANCES. | Arſenic. | *Regulus of arſenic.* | | | Oxyd of arſenic.<br>Arſenic acid. | *White arſenic.*<br>*Arſenical acid.* | Sulphurated oxyd of arſenic, yellow and red.<br>Arſenical oxyd of potaſh. | *Orpiment, Realgar.*<br>*Liver of arſenic.* | Arſeniate of potaſh, &c. | *Arſenical ſalt of Macquer,* &c. | Alloy of arſenic and tin. | *Arſenicated tin.* |
| | Molybdena. | *Regulus of molybdena.* | | | Oxyd of molybdena.<br>Molybdic acid. | *Calx of molybdena.* | Sulphuret of molybdena. | *Molybdena.* | Molybdate of potaſh, &c. | | Alloy, &c. | |
| | Tungſten. | *Regulus of tungſten, Scheele.* | | | Oxyd of tungſten.<br>Tungſtic acid. | *Yellow calx of tungſten.* | | | Tungſtate of lime, &c. | | Alloy, &c. | |
| | Manganeſe. | *Regulus of manganeſe.* | | | Oxyds of manganeſe of different colours. | *Calces of manganeſe.* | | | | | Alloy of manganeſe and iron. | |
| | Nickel. | *Regulus of nickel.* | | | Oxyd of nickel. | *Calx of nickel.* | | | | | Alloy of nickel and iron. | |
| | Cobalt. | *Regulus of cobalt.* | | | Oxyds of cobalt. | *Calces of cobalt.* | Alkaline cobaltic oxyds. | *Precipitates of cobalt rediſſolved by alkalies.* | | | Alloy, &c. | |
| | Biſmuth. | *Regulus of biſmuth.* | | | Oxyds of biſmuth, yellow and white. | *Yellow calx of, magiſtery of biſmuth.* | Sulphurated oxyd of biſmuth. | *Biſmuth precipitated by liver of ſulphur.* | | | Alloy, &c. | |
| | Antimony. | *Regulus of antimony.* | | | White oxyd of antimony by nitrous acid, by muriatic acid, by ſublimation, and by vitrification. | *Diaphoretic antimony,*<br>*Powder of algaroth,*<br>*Argentine flowers,*<br>*Glaſs of antimony.* | Sulphurated oxyd of antimony. | *Kermes mineral,*<br>*Golden ſulphur of antimony,*<br>*Livers of antimony.* | | | Alloy, &c. | |
| | Zinc. | *Zinc, Spelter.* | | | Oxyd of zinc.<br>Sublimed oxyd. | *Calx of zinc.*<br>*Flowers of zinc.* | Sulphurated oxyd of zinc. | *Precipitate of zinc by liver of ſulphur.* | | | Alloy, &c. | |
| | Iron. | | | | Oxyds of iron of different colours. | *Martial æthiops, colcothar,* &c. | Sulphurated oxyd of iron. | | | | Alloy, &c. | |
| | Tin. | | | | White oxyd of tin. | *Calx of tin.* | Yellow ſulphurated oxyd of tin. | *Aurum muſivum.* | | | Alloy, &c. | |
| | Lead. | | | | Oxyds of lead. | *White lead, minium, litharge,* &c. | Sulphurated oxyd of lead. | | | | Alloy, &c. | |
| | Copper. | | | | Oxyds of copper, red, green, and blue. | *Calces of copper, red, green, and blue.* | Ammoniacal oxyd of copper. | *Cuprum ammoniacum.* | | | Alloy, &c. | |
| | Mercury. | *Quickſilver.* | | | Oxyds of mercury, black, yellow, and red. | *Æthiops per ſe.*<br>*Turbith mineral.*<br>*Calcined quickſilver.* | Sulphurated oxyd of mercury, black and red. | *Æthiops mineral,*<br>*Cinnabar.* | | | Amalgams. | |
| | Silver. | | | | Oxyd of ſilver. | *Calx of ſilver.* | Sulphurated oxyd of ſilver. | | | | | |
| | Gold. | | | | Oxyd of gold. | *Calx of gold.* | | | | | Alloy, &c. | |
| | Platina. | | | | Oxyd of Platina. | *Calx of platina.* | | | | | Alloy, &c. | |
| EARTHS. | Silica. | *Vitrifiable earth, quartz.* | | | | | | | | | | |
| | Alumin. | *Argillaceous earth, clay.* | | | | | | | | | | |
| | Baryt. | *Ponderous earth.* | | | | | | | | | | |
| | Lime. | *Calcareous earth.* | | | | | | | | | | |
| | Magneſia. | *Muriatic earth.* | | | | | | | | | | |
| ALKALIS. | Potaſh. | *Vegetable alkali.* | | | | | | | | | | |
| | Soda. | *Mineral alkali.* | | | | | | | | | | |